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# Frontier Themes in Finland

W. R. MEAD

## THE ASCENDANCY OF THE LITTORAL

ALMOST ALL REGIONAL MAPS OF FINLAND identify a prominent coastal zone. This zone enjoys widespread sedimentary soils and a moderately tempered climate, the former due to emergence from the sea and the latter the result of proximity to it. It is the oldest settled part of the country and its farmland has been improved physically by long cultivation: it is the most favoured part of Finland locationally. In his university lectures at Helsinki the Finnish historian Zachris Topelius observed a century ago, "The sea bears the active, civilising elements of the earth and a country which has communication with the sea can never stagnate . . . unless by its own fault".<sup>1</sup> All of these advantages have given rise to what Kustaa Vilkuna, the Finnish academician, calls "the ascendancy of the littoral".<sup>2</sup> The ascendancy may have relaxed, but the coastal zone nevertheless continues to enjoy precedence over almost all other natural regions in Finland. As a general principle, the farther the distance from the coast, the greater the hardships encountered. There are limited exceptions, such as the lean lands of north Satakunta called "Satakunta Lapland" or the fertile lime-rich clays around Kuusamo church village in the extreme northeast. Usually, however, climate becomes harsher, soils become poorer, swamps become more extensive. At the same time, growing distance from markets for inland products and from sources of supply for up-country consumers imposes an economic tax.

It was the progressive decrease in opportunity as men moved to the interior which impressed the academic husbandmen of the later eighteenth century. Few were more aware of this than Per Johan Bladh (1746-1816), who contributed a prize essay to the Finnish Economic Society in 1802.<sup>3</sup> The essay is a sensitive study in locational opportunities and from its observations upon transport costs Fig. 1, which shows the increasing restraints upon trading from coast to interior, has been compiled. The upper part of the figure tabulates the maximum economic distance over which certain saleable commodities could be transported to Finnish export harbours. The lower part translates the distances into a number of concentric zones of opportunity which are given an arbitrary setting against Bladh's home coast of Ostrobothnia. The pattern is highly generalized; but the principle is roughly operative and tendencies later identified by J. H. von Thunen are immediately suggested.<sup>4</sup>

In practical terms, the possibilities of commodity movement offered Finnish countryfolk two outlets. First, some degree of commercial agriculture seemed possible almost everywhere, though widespread subsistence farming prevailed. Secondly, there were the woodlands—divided into those commercially exploitable and those which contributed little to the countryman's exchequer. Forestry income was small around the coastal zone, which had been largely denuded of commercial timber by the end of the eighteenth century, and in the interior backwoods, which had been ravaged by rotational burning. Yet although the extensive softwoods had no exchange value over large areas, they made a substantial contribution in kind and one apologist could write of them: "They give bread, warmth, light, shoes, fencing materials, travelling equipment, his house and many other things for (a man's) need and well-being, they are a refuge in time of difficulty and his wealth in better days."<sup>5</sup> The distributions prevailing in Fig. 1 reflected a set of transport conditions in which packhorse, cart, sleigh and row-boat served the Ostrobothnian hinterland; while wooden sailing vessels, of a maximum burden of several hundred tons, carried wares over summer seas. These means of transport suggest that a zone at most a hundred miles wide was commercially usable for one purpose or another. The remainder tended to be wasteland, apart from isolated patches of favoured river or lake terrace, the products of which were brought into regional markets by the more enterprising homesteaders.

Per Bladh, "the improver", contemplated the transformation of this wasteland. Transformation had to come from central authority as well as through private initiative. A relaxation of transport conditions and of trading regulations on the part of the former could spur the energies of the latter. The enterprise of colonists was recognized by the Economic Society and Fig. 2 is based upon citations accompanying prizes given to three from south-eastern Finland. Bladh was equally aware of the need to husband more carefully the resources of the commercially developed zone. The principle which he proposed sounds trite today, but it was less laboured 140 years ago. "The farther the land transport", he wrote, "the more necessary is it through refinement to reduce the materials to the least weight and volume consistent with the highest values."

It would be unfair to present Bladh's ideas as savouring too strongly of the "isolated state", for he was very alert to forces which might speedily change Finnish economic relations. First, he could foresee substantial regional developments resulting from the establishment of new manufacturing plants. Secondly, he was aware that Finnish resource values were also an expression of competitive sources of supply and were sensitive to "events in the political world". Bladh's system of values was bounded on the east by the Russian frontier; though its restraints diminished after 1809 and much of interior Finland became White Sea hinterland as well as Baltic hinterland.

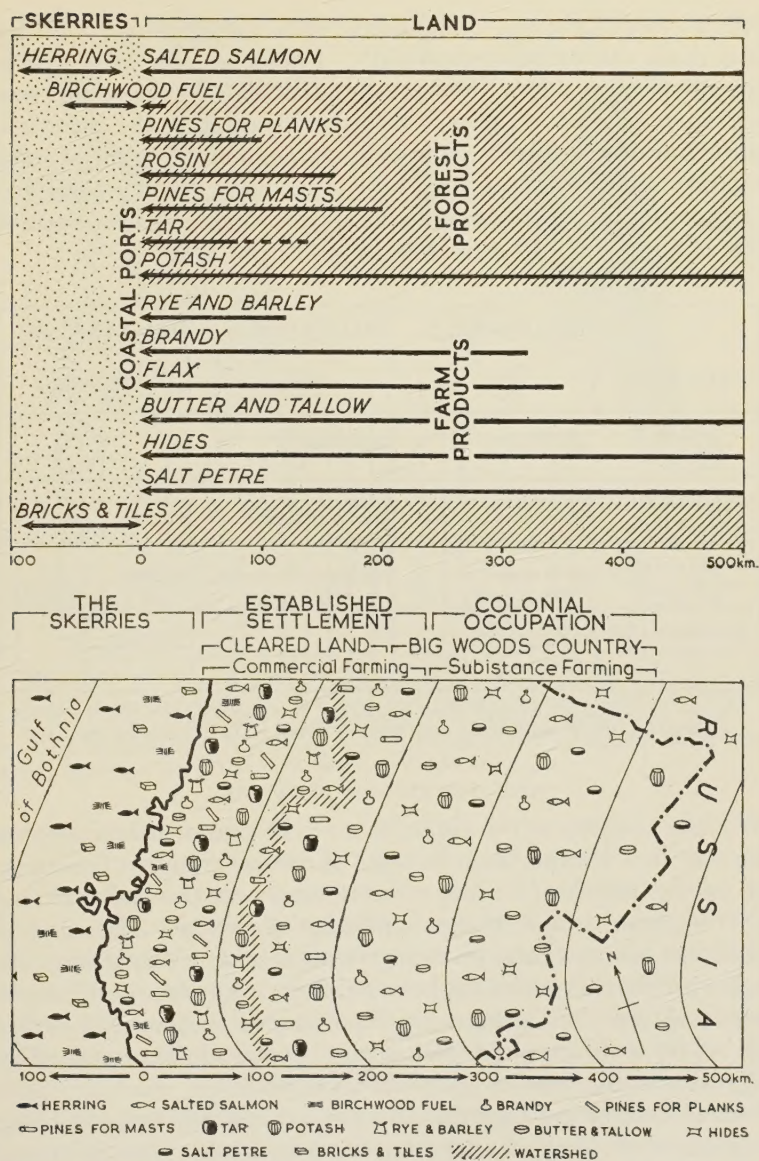


Fig. 1.—Market opportunities for Finland's rural producers at the end of the eighteenth century. (Above) A reconstruction based upon information recorded by P. A. Bladh. (Below) The same information given setting against the Bothnian coast.

The conversion of Finnish wastelands has responded to a succession of different policies. In Bladh's day, relatively little encouragement was given to pioneering initiative. Indeed, the tax-gatherer came all too soon to the clearing in the wood and Bladh opposed the taxation of hard-won homesteads which created "a fruitful land out of a frost pocket or a savage waste". The problem was to distinguish between "the worthy new settlers" and those who merely exploited virgin land,

"fulfilling the minimum obligations, then clearing out and leaving behind them the ruined forestland". Independently of a benevolent twentieth-century policy towards land-breakers, changing resource values have carried economic frontiers deep into the country and scientific ingenuity has written new biological boundaries into the wasteland. Since Bladh's time, the approach has changed so that the contemporary problem is to assess the scale of assistance to the frontiersman, not the degree of extraction from him.

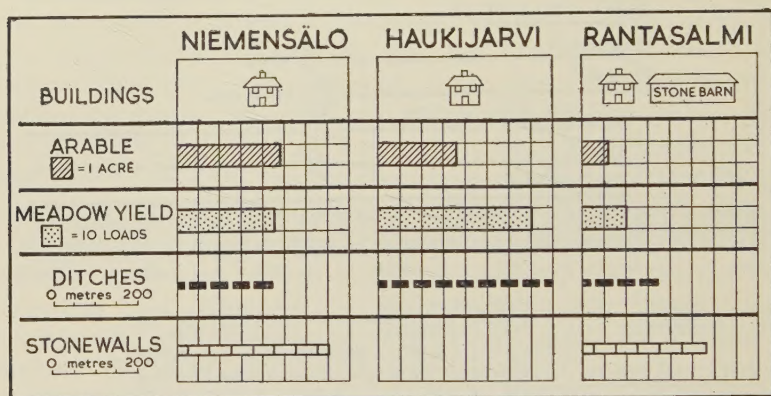


Fig. 2.—Colonial settlements from Kerimäki, the pioneers of which received prizes from the Finnish Economic Society in the early nineteenth century.

#### THE THREEFOLD FRONTIER

The frontier zone has never meant more for Finland than it does today. Living on the frontier has at least three meanings. It can mean living on the physical frontier of settlement, on the political frontier of the country or on the economic frontier of existence. In some places and for some families these three frontiers coincide. Where they do not, there are involved interactions between them. The frontiers, moreover, are not constant: to a greater or lesser degree they are all subject to change. The problems of the physical and economic frontiers in Finland are aggravated by those of the political frontier.

It was evident before 1939 that to sustain the life of Finland's marginal settlements some form of assistance must be given. The communities of the political frontier, sensing a common need, gave birth in 1923 to a loose organization of marchland parishes called *Rajaseutuyhdistys*. Most of these civil parishes bordered by the Karelian A.S.R. were (and remain) completely without contact on the east: from the human standpoint, the border is absolute. Only two parishes have customs stations and they are both in south Karelia. The border parishes, unique in Finland, are probably without equal in Europe in the degree of their isolation. Economically, they are less favourably situated in comparison with other parts of Finland than they were during the period of Russian suzerainty (1809-1917).<sup>6</sup>

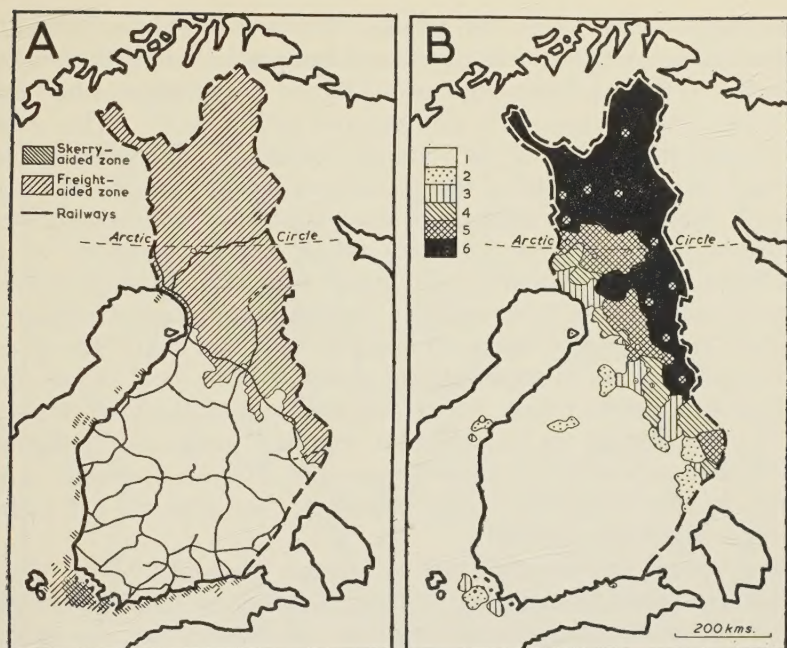


Fig. 3.—A. The areas to which favourable freight rate treatment is allotted. The rail pattern is included. B. The proposals for salary adjustments in favour of school teachers as expressed geographically in *Komitean mietintö* 1956. The five shadings illustrate the relative degree of assistance, heavier assistance in the more darkly shaded areas. The circles indicate urban areas.

In response to these frontier difficulties, a piecemeal system of aid has emerged with the object of equalizing opportunity so that undue migration to urban areas and to the more favoured parts of the coastal zone is checked. If the geographical distribution of sample forms of assistance is given in maps, the essential emphasis on the northlands is evident. Three examples of aid are freight-rate relief, milk production subsidies and teachers' salaries. Freight-rate relief may be legislated annually and covers bread grains, fodder, A.I.V. acid for silage, artificial manure, agricultural lime and certain foodstuffs.<sup>7</sup> Fig. 3 shows that a considerable number of parishes receiving aid are without railways. Salary adjustments for school teachers in remoter areas were already in existence thirty years ago. They have been more precisely formulated in the interval and have been the object of recent review. One proposal has been to establish five basic scales of payment, with each scale related to a group of parishes, the church villages of which would commonly be regarded as more favoured places of residence (cf. Fig. 4).<sup>8</sup> Subsidies to aid the production of milk and milk products are also related to the degree of accessibility.<sup>9</sup>

The changes in Finland's eastern boundary in 1944 aggravated its frontier problems. A new attack upon the forests was set in motion to accommodate displaced farmers from the lost lands. The process of

pioneering showed at least two phases. The first was characterized by manual labour—urgency and absence of equipment calling for frequent reminders of Rudyard Kipling's poetic figure *The Foreloper*, who "must blaze the nation's way, with hatchet and with brand". The second phase has been dominated by technical assistance. The new technical approach to the occupation of the natural frontier lands has almost obsessed some administrators, so that wasteland conversion seems sometimes to have been favoured above the maintenance of the established *ecumene*. Having succumbed militarily, Finland appears to have launched a compensatory assault upon "the kingdom of Pohjola", the legendary northern realm of frost and cold. The system of economic aids has strengthened the attack,<sup>10</sup> while local and regional investment in power plants, mines, factories and workshops which are continuously shifting the physical and economic margins of settlement, are another aspect of the grand strategy. Finnish Lapland is big enough to give the illusion of tranquillity; but beneath the surface there is considerable turmoil.

These moves are not confined to interior Finland. Maps of subsidized areas show that the skerry fringe (*saaristo*, in Finnish: *skärgård*, in Swedish) is also included (cf. Fig. 4). In Bladh's day, the skerries were accounted a favourable foreland to the coastal zone of ascendancy. They were accessible and they enjoyed the longest growing season concomitant with latitude in Finland. In a self-sufficient economy, their cultivation units matched prevailing equipment and techniques, while a modest harvest of fish and fowl from sea and shore supplemented farm products. Almost every step towards a commercial economy, however, has reduced their advantages. Indeed, as the scale of rural operations has changed and the standards of farm products have risen, those of the skerries have often lagged behind. Rising farm standards call for greater output per capita, speedier marketing and swifter adjustments to markets. The peculiar problems of the skerries have been considered by a special investigating committee.<sup>11</sup> Their setting is given in Fig. 5 which shows a typical outer skerry parish—Houtskär in Turku (Åbo) archipelago. The frequency and intimacy of all forms of rural services are relaxed in this zone of discontinuous settlement. Steamer services grow more expensive: in winter, they must be replaced by reliable highways over the ice. When ice neither bears nor breaks, as much as three weeks' isolation may result; though private aircraft may be hired in emergency. Continuity of employment is interrupted by seasonal circumstances. Costs of electrical transmission, postal and telephone services become excessive: educational and health services are spread more thinly. In Turku archipelago, for example, forty special postal services must be operated, and the average number of children per skerry school is half that of a mainland school. A retreat from many skerry areas follows and this is checked but little by the growing range of subsidies. The summer migration of holiday-makers

represents a slight counter-movement; but the general neglect of the skerries provides a curious contrast to the planned transformation of the interior wastelands.

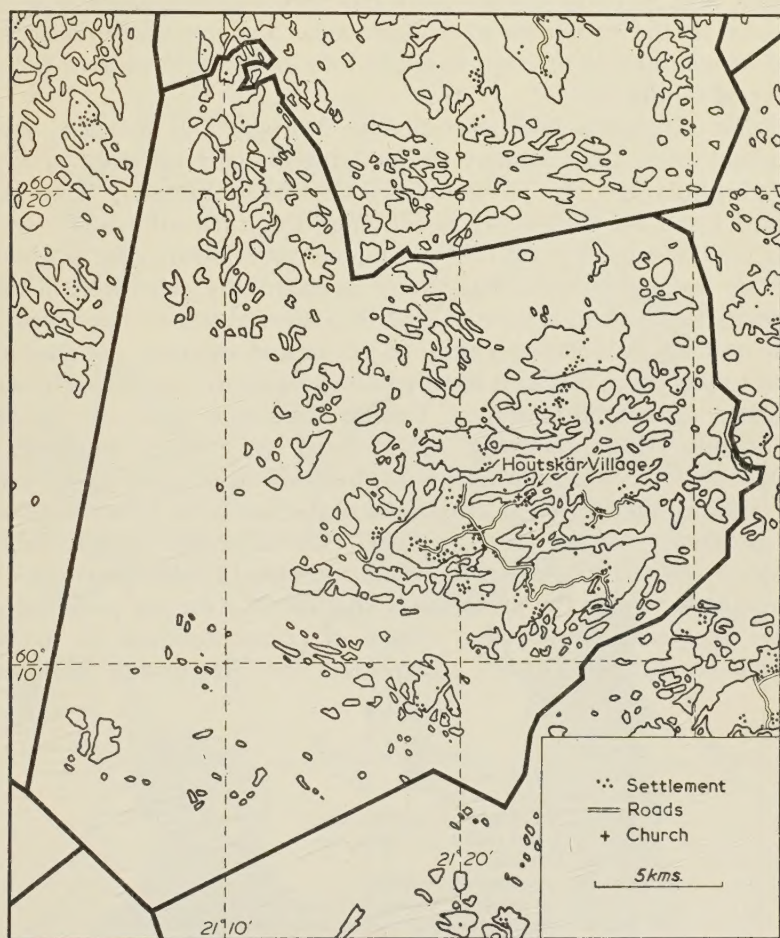


Fig. 4.—The parish of Houtskär, in Turku (Åbo) archipelago. This shows the fragmentation encountered in an island parish.

It is not a new contrast, for advance and retreat from settlement margins have proceeded simultaneously in the past. New technical facilities, forms of economic aid and national policies account for adjustments in the settlement of the physical, economic and political margins of Finland. Redistribution takes place with differing speeds, so that the settlement gaps of the interior are being filled more speedily than those of the coastal fringes are being created. Meanwhile, the coastal zone of ascendancy sustains the advance into the interior, accepts the retreat from the skerries and tends to draw to itself the best from both foreland and hinterland.

## THE SEARCH FOR A FORMULA

The accumulation of legislation dealing with the marginal areas coupled with the general disturbance given to their definition by wartime and post-war circumstance has encouraged Finns to seek new solutions to the problems of frontier aid. The recommendations of a recent commission attempt to bring into focus the divergent policies of several ministries.<sup>12</sup>

Similar discussion has proceeded in Norway and Sweden, where contributions to assist country people have shown tendencies to duplication and divergence. The Swedish *kallortstilläg* (literally, "cold place subsidy") and the Norwegian *høfjellstillegg* (high fell subsidy) or *Arktisk tillegg* (Arctic subsidy—with the most generous allowance for Svalbard) illustrate the nature of assistance and its essentially geographical basis. In reorganizing rural assistance, Swedish administrators have weighed in the balance the relative lengths of winter and summer, the character of the countryside, distance from a railway station and accessibility to an urban centre. Preliminary Finnish discussion took into account this Scandinavian experience and centred upon three features: the average pattern of annual isotherms, location in relation to an urban area (which called for some assessment of the hierarchy of urban places) and proximity to the state frontier. Of different though related character was the suggestion to create a simple index to deal with the archipelagos. From the preliminary discussion, a formal proposal was drawn up which employed a system of points designed to indicate regional handicaps. Table I summarizes the criteria and the system

Table I

Criteria	Number of Points
1. Population density:—	
At most 1 per sq. km.	3
Over 1, but under 2.5 per sq. km.	2
Over 2.5, but under 5.5 per sq. km.	1
2. Urban relation:—	
300 km. or more to Helsinki	1
200 km. or more to Turku or Tampere	
100 km. from a town of 10,000 inhabitants or more	
50 km. from a smaller administrative centre	
3. Frontier relation:—	
Location along the national border	1
4. Climatic setting:—	
Average annual isotherm $-1^{\circ}\text{C}/+1^{\circ}\text{C}$	1
Average annual isotherm less than $-1^{\circ}\text{C}$	2

of weighting employed. According to this index a maximum of seven points represented the peak of discomfiture to be redressed. In addition, a set of island criteria was identified with adjustments according to whether the settlements were over 30 km. from the mainland or a major island (e.g., Åland *fastland*), over 20 km. from these territories or over 3 km. The aid of geographers was enlisted in the compilation of the indexes.

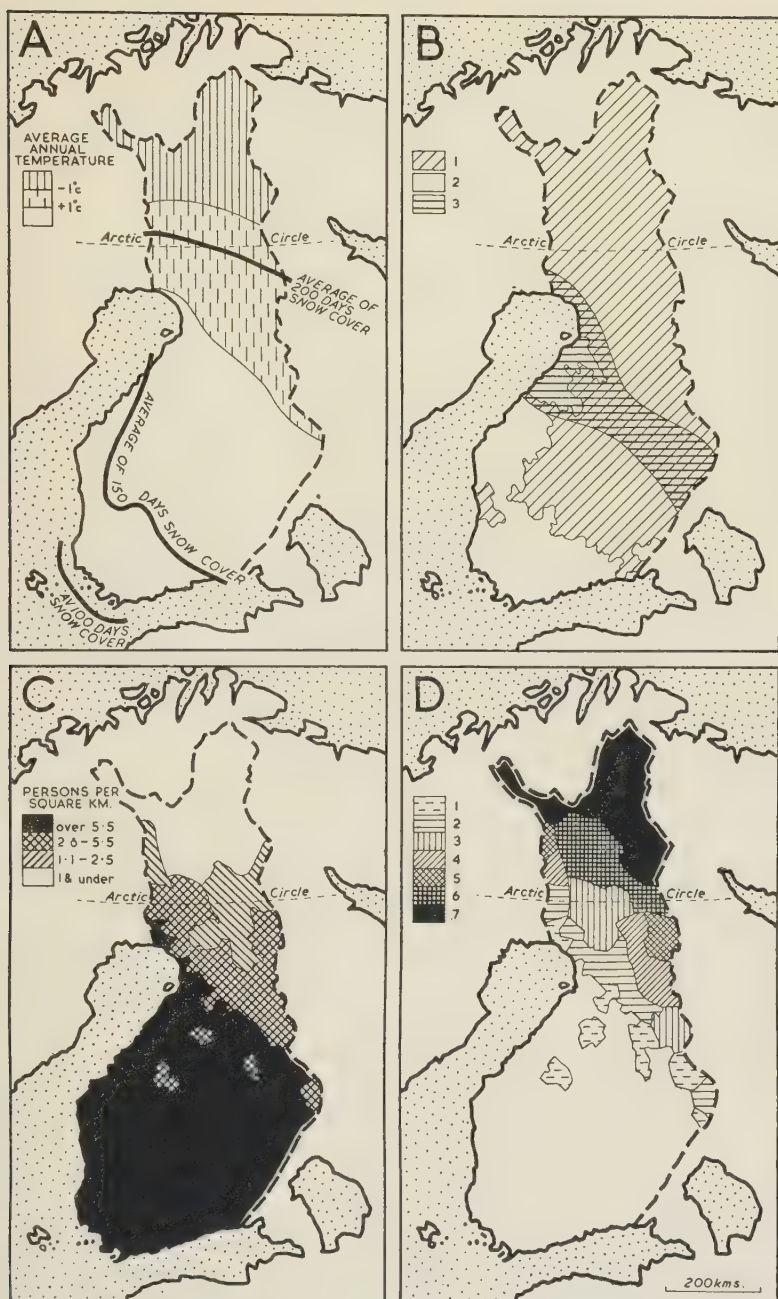


Fig. 5.—A selected list of boundaries which emphasize the frontier theme in Finnish rural areas. A. Climatic restraints. B. The nature of land clearance, showing: 1. continuity of woodland cover; 2. continuity of cultivated area; 3. the zone of most active land clearance 1930-50; (based on W. R. Mead, *Farming in Finland*, London, 1953). C. Population density. D. Degrees of incidence of "frontier criteria". The seven shadings are based upon combinations of the criteria listed in Table I. The heaviest shading indicates the heaviest incidence.

This rational attempt to express the disadvantages of location and to establish a unitary code out of the diverse forms of assistance is a movement forward from the descriptive to the analytical appreciation of Finland's frontier territories. A simple piece of apparatus is proposed to replace the complicated existing structure of subsidies. It is a neat but mechanical approach which has yet to be put to the test of application on the ground. The present boundaries of subsidized areas (cf. Fig. 5D) tend to follow the outlines of parishes or related chapelries. If the new system of zones is imposed, a variety of marginal adjustments will dissolve the present boundary line between assisted and unassisted settlements.

The taxation of land in Finland provides a parallel situation, because formulae for land assessment have been successfully applied. In farm taxation, each constituent unit of land is identified qualitatively and its taxable assessment modified according to the degree of stoniness or of topographical variation (which may affect the use of the plough, tractor or other labour-saving equipment). Distance from the nearest highway is also taken into account. Land taxation is based principally upon site criteria: schemes of agricultural assistance look to the broader regional setting. In theory, it should be possible to legislate for these schemes according to a formula similar to that which has been constructed for land taxation.

#### THE RETREATING FRONTIER

Settlement of Finland by Finn and Swede has been from the littoral to the interior and, in general, from south to north. It has continued independently of the intermittent swing of political frontiers across the land, though their shifts have disturbed and sometimes diverted it. The pioneer zone contracted sharply following changes in the rigid circumstance of transport described by Bladh. Frontiers of opportunity advanced over a broad front in response to railway and iron-hulled steamship: subsequently, they have shown local and regional adjustment in response to the automobile. Yet, despite these changes, the occupation of virgin land continues, so that much of Finland may be termed pioneer country. Moreover, there are almost a million hectares of woodland, classified as beyond the economic limits of exploitation, which might be called its "isolated estate". Islands of farm settlement, recalling the subsistence holdings dispersed widely over Bladh's interior Finland, prevail here. In Bladh's time, economists urged the removal of restraints to promote the settlement of the waste: in the interval, restraints have withered and a system of encouragements has come into being.

A mixture of motives lies behind this system. It is too simple to regard it as a measure designed only to check the flow of population to more favoured areas. It is more important to view it as a means of counteracting centrifugal tendencies. In reaching towards the Arctic

and continental limits of Finland, the rural settler has sometimes deliberately rejected the control of central authority. Renewing contact with the natural world on the margin of settlement breeds a spirit of independence. Moreover, the hardships of frontier life can give rise to extreme mental attitudes which express themselves in, for example, strong local patriotism, communism and pietism. The extent to which the individualist of the frontier lands will reciprocate the offer of central authority to soften the hardships of life with a fuller measure of loyalty is debatable. A third motive must not be disregarded. The empty lands are held to be almost a challenge to central authority. It is as though the state abhorred a vacuum, so that the occupation of the wilderness is almost accounted a desirable end in itself. It is a motive which brings the wheel full circle, for it would be possible to build up a case for artificially promoting the war on the wilderness. F. J. Turner, the Wisconsin historian, wrote of "perennial rebirth" on the frontiers as furnishing one of the strongest features of America's character.<sup>13</sup> The "perennial rebirth" of Finland on its forest frontiers has been an important aspect of its national inheritance. Is it a mainspring of the country's personality which can be kept in motion artificially?

In 1802, perhaps a third of Finland contributed significantly to the stream of saleable commodities: today, perhaps a third of the land fails to produce a significant quota of merchantable goods. The situation has changed, but some of Bladh's observations have continuing relevance. "We have scarcely come out from our original wasteland: our climate, our distance from lands which are in their prime, our unfortunate war and its consequences, have kept us in a state of primitive ineffectiveness", he wrote. "Finland has, however, natural bases upon which to build a modest well-being, which are as sound as those of any other country . . . One who is born poor can far sooner work his way to wealth than a rich man can recover his fallen estate."

In Finland's hierarchy of human regions, the coastal zone persists as an "aristocrat". Its lacustrine hinterland, constituting a second third, has been incorporated within the effective economic realm as a middle-class buffer. The remainder is a kind of third estate. It is an "inland empire" awaiting emancipation or a dependency to be supported from without according to the point of view. Frontiers have retreated to it and its life is a series of uneasy compromises about the shifting boundaries which are inscribed within it. Perhaps most difficult of all is that it must ultimately reconcile a spiritual independence born of detachment and a material dependence resulting from location.

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- <sup>4</sup> J. H. von Thünen, *Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie*, Rostock, 1826. Cf. also E. E. Kaila, *Pohjanmaa ja Meri*, Helsinki, 1931.
- <sup>5</sup> In *Abo Underrättelser*, vol. 8, 1818, p. 26.
- <sup>6</sup> The degree of openness of the imperial boundary is evidenced in *Utlänningar resande bok* and other immigrant documents encountered in the provincial archives of such towns as Kuopio.
- <sup>7</sup> E.g., Acts of Finnish Parliament, 1956/167, 1957/142.
- <sup>8</sup> *Komitean mietintö*, no. 9, 1956. *Rajaseutukuntien kansakoulu-komitean mietintö*, 1958, describes fully the inquiries which have been made into teachers' and educational subsidies in the border areas.
- <sup>9</sup> Act of Finnish Parliament, 1957/87.
- <sup>10</sup> E.g., new industries set up in Oulu and Lapland provinces between 1958 and 1967 are to be free of taxation for four years. In the transformation of the north, the Lapp is not wholly forgotten; cf. K. Nickul, "Saamelaisten sopeutumisongelmia" (Adaptation problems of the Lapps), *Terra*, vol. 71, no. 1, 1959, pp. 1-17. Cf. also H. Šmeds, "Post-war land clearance and pioneering activities in Finland", *Fennia*, vol. 83, 1960.
- <sup>11</sup> *Saaristo komitean mietintö* 1957. Geographers are also defining in current projects the nature of the *skärgård* in their preparations for a *Skärgårdsatlas* (to be published 1960).
- <sup>12</sup> *Syrjäseutulisä komitean mietintö* 1956.
- <sup>13</sup> *The Early Writings of F. J. Turner*, Madison, 1938, p. 183 *et seq.*, and J. L. M. Gulley, "The Turnerian Frontier", *Tijdschrift voor Economische en Sociale Geografie*, 1959, pp. 65-72 and 81-91.

# Agricultural Progress in Ulster

L. J. SYMONS

AT THE PRESENT TIME ULSTER is the scene of an energetic campaign to intensify agriculture. During the war of 1939-45 simple areal intensification, i.e., increased output from a given area of land, almost regardless of costs, was the objective in Ulster\* as elsewhere in the United Kingdom. Today the aim is intensification in face of competition from overseas countries, and that implies economic intensification. Quality is as essential as quantity, and products in which the province is best able to compete in the British market, namely dairy products, high-class beef, mutton, and pig-meat and poultry products, have taken precedence over milk and arable crops.

The rise in agricultural output in Northern Ireland is shown most simply by index-numbers of net output, i.e. gross output less feeding stuffs, imported stores and seeds, at constant prices. There was a rise from a pre-war average of 100 to 131.9 for 1949-50. Since the war the rate of increase has been greater than it was during the war. In 1946 net output was only 5 per cent greater than in 1937, whereas in 1951 it was 17 per cent greater than in 1946.<sup>1</sup> The explanation may lie in the greater suitability for Ulster conditions of the present methods based on grassland compared with the compulsory tillage economy of the war years. Later figures on a comparable basis are not at present available, but the value of net output at *current* prices rose from about £41 million in 1951 to £56 million in 1956. The annual agricultural statistics demonstrate that the increase has been essentially from livestock. Summary figures for selected critical years given in Table I show the rise in the total numbers of cattle, sheep and pigs, and milk production. A slight fall in milk production in 1959 is partly the outcome of price adjustments designed to have this effect because of the trading losses sustained by the Milk Marketing Board. Whereas all milk purchased by the Northern Ireland Board is paid for at liquid milk rates typically 30 per cent only has been consumed as milk, the remainder having to be disposed of by manufacture. Average lactation per cow continues to improve and so the reduction in the number of dairy cattle and increase in other cattle is viewed with satisfaction by the authorities. It is generally

► Dr. Symons, who is a lecturer in geography at the Queen's University of Belfast, read the paper on which this article is based at the Annual Conference of the Geographical Association in London on 31st December 1958. He acknowledges the co-operation of the Ministry of Agriculture for Northern Ireland and financial help from the research fund of the Queen's University of Belfast.

\* The historic name of Ulster is used here as an alternative to the official name of Northern Ireland, in accordance with local custom. It should be read as referring only to the six counties of the ancient nine-county province that remain in the United Kingdom.

considered that there remains scope for further considerable increase in numbers of beef cattle, sheep and pigs.

*Table I*  
LIVESTOCK IN NORTHERN IRELAND  
Numbers at 1st June (thousands)

	1937	1946	1951	1958
<i>Cattle total</i>	730	913	961	980
Dairy cattle <sup>a</sup>	260	356	331	303
Other cattle	470	557	630	677
<i>Sheep total</i>	829	640	672	980
<i>Pigs total</i>	570	311	585	790
Million gallons				
<i>Milk production total</i>	1936-7 84	1945-6 100	1950-1 118	1957-8 143

<sup>a</sup> Cows and heifers in milk or in calf.

Statistics supplied by Ministry of Agriculture for Northern Ireland.

The increase in agricultural production has been achieved with a smaller labour force; index numbers of value of net agricultural produce (at constant prices) per head of labour showed an increase from the pre-war base 100 to 140 in 1951. The decrease in the labour force is, however, a less welcome aspect of post-war adjustment, bearing in mind the high level of unemployment in Northern Ireland. In 1958 this averaged about 8 per cent of the registered labour force, about three times the national average for the United Kingdom, and it has been persistently between 5.5 and 10 per cent since the end of the war.

Agriculture is still the leading industry in Ulster, employing more than a quarter of all the occupied men in the province, predominantly as owner-occupiers and family labour. There are now (1959) 95,000 owners and full-time workers compared with 130,000 in 1938. This decrease of 35,000 is partly to be explained by the amalgamation of holdings, for the number of farms is now under 73,000 compared with the 1938 enumeration of over 90,000. The omission from the returns of small plots of land formerly counted as farms has resulted in a lowering of the number by about 4000 but there remains an apparently genuine decrease of 13,000 to be explained mainly by amalgamation. Most of the merging has been in holdings of 30 acres or less and the enlarged units are commonly run on a basis requiring less labour than was devoted to the former separate farms. The balance of the decrease in employment has presumably been made possible by reduction in tillage in favour of livestock rearing through grass, and mechanization. These figures suggest that productivity of the land must further be increased if the present demand for agricultural labour is to be sustained.

There is a great deal of land in Ulster which is still under-farmed. In some cases the land is fertile and in regular farming use but management is poor or labour, or capital invested, is inadequate. In other cases reverted or unimproved heath and bog land offers a direct challenge to progressive farmers.

The obstacles to intensification in Ulster are, however, greater than those operating in most parts of Britain.



Fig. 1

### *Environmental factors*

Ulster appears transitional between southern Ireland and western Scotland in the detail of the cool humid climate and also in its great variety of landforms and soils. No mountain reaches 3000 feet but large areas lie above 500 feet (Fig. 1), at which height lower temperatures, higher rainfall and greater cloud cover significantly hinder cropping. Except in the granitic Mourne Mountains and around the coasts of Antrim and Derry, where the cliffs of the basalt plateau oppose the sea, slopes are rarely sufficiently steep to render mechanized cultivation impracticable. On the other hand peat occurs on flat and slightly sloping surfaces at all levels. In spite of drainage and reclamation about 100,000 acres of basin bog remain in the valleys while some 500,000 acres of hill and moorland are covered by blanket bog.<sup>2</sup> Few areas in the lowlands are free of glacial drift. Conditions most

suitable for cultivation are provided by the gravel mounds and ridges which rise from the bogs of the Lower Bann valley and occur extensively in Tyrone and Derry. These hungry but light and well-drained soils contrast with the heavy, sticky soils of south Antrim and Fermanagh, which favour pastoral husbandry. In the drumlin belt of Down and Armagh light stony soils locally yield land suited to market gardening and fruit cultivation, but conditions are very variable and over 80 per cent of the improved land in these counties is under grass. Most of the soils present podsolized or gleyed profiles, though in the more fertile parts they are classifiable as brown-earths. The undulating nature of the topography, the importance of minor variations in the efficiency of drainage and different stages of reclamation or reversion from field to field, produce throughout the province, but especially in the poorer areas, a highly complex pattern of land utilization—a mosaic of tillage, grassland and bog, well revealed in the maps of the Land Utilisation Survey of Northern Ireland. So, except in its hill-masses, the physical character of the land of Ulster presents moderate opportunities for a limited range of agricultural products, notably those derived from livestock rearing and dairying and the growing of hardy crops such as oats and barley, potatoes, and some other green crops but not normally wheat or sugar beet.

### *Marketing*

The range of produce is further restricted by the limited nature of the local market. If we regard all persons occupied in agriculture as food producers and the remainder of the population as consumers representing a potential market, there are in England and Wales 40 consumers for every food producer, whereas in Northern Ireland there are only 13.<sup>3</sup> In practice the market is still more restricted by the limited tastes of the mass of the people, there being, even in Belfast, a very small demand for, notably, fresh vegetables and cheese. For the surplus production, Britain offers a market, but the Ulster producer suffers marked disadvantages compared with his counterpart in Britain.

The distance from Ulster to the main centres of population is greater than from any other part of the United Kingdom except the northern Highlands of Scotland. The distance is disproportionately accentuated by the sea passage which makes the export of fresh milk impracticable under normal conditions and reduces the competing power of producers of fresh vegetables, because of the deterioration in transit, while all products suffer from freight rates which have always been high in relation to the distance in miles.<sup>4</sup> Ulster's distance from its markets must seem small hindrance when compared with those of the Dominions and colonies, especially Australia and New Zealand, but Ulster has none of the geographical advantages which have enabled New Zealand to produce commodities similar to those of Europe with

less work.<sup>5</sup> Rather is it physically less favoured than any other part of the British Isles, again excepting the Highlands of Scotland.

Secondly, there is a large number of producers each selling a comparatively small surplus with consequent high cost of collection of produce and difficulty in standardizing grading. Ulster has failed to develop a system of production and marketing comparable with that achieved by Denmark, which is precisely what it needs to offset its physical and spatial disabilities relative to other parts of the British Isles. Marketing schemes for individual products have been introduced and improved gradually during the past thirty years, but there are still notable gaps and the administrative costs of all the schemes are high. Ulster can claim credit for pioneering compulsory marking and grading in the United Kingdom with the first of its Egg Marketing Schemes (1924) but it was not internationally a leader in this respect, being forced to introduce control and grading of its exports of eggs, butter, meat, potatoes and fruit by steps taken in this direction by other countries. Later schemes have tended to follow British legislation rather than to offer any kind of lead.

Ulster farmers take pride in their rugged individualism and undoubtedly this is a great quality, but their reluctance to accept grading of produce and the penalties consequent upon not maintaining standards, and their opposition or at least apathy towards co-operative schemes, must be rated among the principal obstacles to greater intensification of the agriculture of the province.

#### *Land tenure*

In addition the land is divided among a very large number of persons and consequently farms are small. Although in this respect, too, the extremes found elsewhere in Ireland are not common in Northern Ireland and there has been a certain amount of amalgamation of holdings during the past century, there is no denying the fact that, by British standards, the farms of Ulster are small indeed. It will be seen from Fig. 2 that although the number of holdings registered as of over 100 acres has doubled since 1861 it is still only 5.6 per cent of the total. Nearly 60 per cent of Ulster farms today are of less than 30 acres. It must further be remembered that these are figures of total acreage and so include rough grazing "at par". If uncultivable land were neglected or taken at the commonly accepted average equivalent of 10 acres rough to one acre cultivable the predominance of small farms would be even more evident. Thus to say that farms of under 50 acres number 78 per cent of the total in Northern Ireland compared with 64 per cent in Great Britain is to under-estimate the discrepancy, because the figures for farms in Britain take account only of crops and grass, excluding rough grazings. The relevance of this predominance of small farms is seen not only in the difficulty of using labour, buildings and machinery economically, but in the task of agricultural advisers

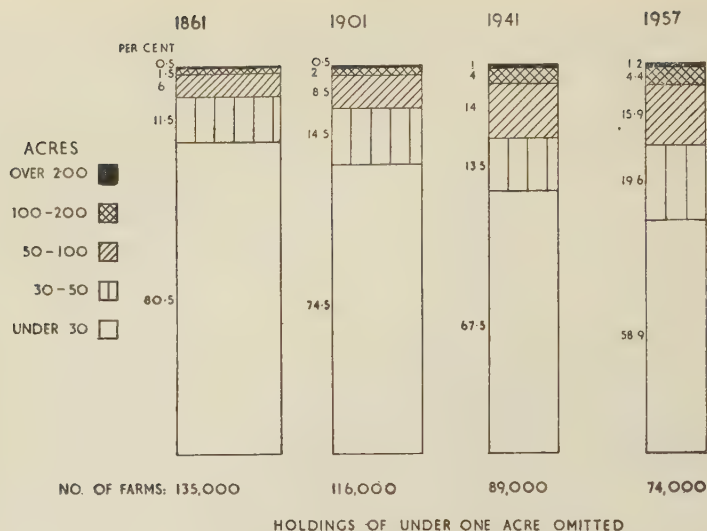


Fig. 2.—Distribution of farms by size, showing consolidation of holdings. Based on the Agricultural Statistics for Northern Ireland.

concerned with disseminating improved farming techniques. In the province of Ulster, which is about the same size and has about the same acreage of crops and grass as Yorkshire, there are about 73,000 land holdings counted as farms. In Yorkshire there are 35,000, less than half as many.

Associated with the smallness and great number of farms is the system of land tenure. The majority of farmers in Ulster hold in fee simple the land they occupy. Letting is more common in the hills than in the lowlands, because parts of large holdings owned by public water and forestry authorities are leased for grazing, but the total number of such holdings is relatively small and altogether about 80 per cent of the land of Northern Ireland is owner-occupied. This position derives from the redistribution of ownership of land, whereby, following long and bitter agitation throughout Ireland, the great estates were broken up and the individual farms sold to the tenants under legislation from 1870 onwards. An Act of 1885 authorized the advance to tenants of the entire purchase money, in cash, one of 1903 included the introduction of sales by estates instead of by individual holdings, and finally the Land Purchase Act of 1925 compelled the sale of the remaining rented holdings in Northern Ireland to the tenants.

Consequently the farmers of Northern Ireland have a permanent interest in their land and there is not the controversy over the rights and liabilities of landlord and tenant that rages currently in Britain. On the other hand, accession of ownership has not been accompanied by adequate increases in the availability of capital for improvements, or education in farming practice. Nor has there been general amalgamation of minute and uneconomic holdings. Legislation restricting

the letting for more than one year of land on which purchasing annuities were still being paid was designed to prevent a new landlord-tenant system replacing the old, but it also prevented enterprising farmers who were handicapped by the smallness of their farms from leasing neighbouring holdings which were not being adequately farmed. The restrictions on long-term letting are no longer significant but there is widespread belief that if the land is let for longer than a year the tenant may claim right of purchase. The desire to own land is deeply rooted in Ulster people and there is a consequent reluctance on the part of owners to sell land even if they themselves do not want to farm. This has led to the growth of conacre letting, in which land is let for a year, or eleven months, at a time. The letting may be by individual fields and is commonly by auction.<sup>6</sup> Thus, the man who takes conacre has no long-term interest in the land and will normally extract from it what he can with the minimum of input. Draining, in particular, is generally neglected. About one-tenth of the cultivated acreage of the province is in conacre year by year. This practice is steadily draining the accrued fertility of the land and must be regarded as one of the most pernicious aspects of the agricultural system of Ulster.

Two other aspects of the land-ownership pattern which militate against the improvement of the land and the intensification of production are the layout of farms, often in several separate units, and joint ownership, the sharing of title on land which is undivided by fences. These are legacies from the rundale or runrig system which formerly prevailed widely in Ulster. That system, based on the continuously cropped infield divided into strips of land which were annually re-allocated to the joint tenants, and the outfield grazed in common, was slowly brought to a belated end during the nineteenth century.<sup>7</sup> Complete rationalization was hindered by the need to ensure that each farmer retained a share of each quality of land occurring in the townland, resulting in the striped pattern and small fields illustrated in Fig. 3 (B). This is typical of upland and much of lowland Ulster, whereas farms of shape and size as efficient as shown in Fig. 3 (A) are rare. Fig. 3 (B) also illustrates the common amalgamation of spatially separated farms. Only exceptionally is there opportunity to join together neighbouring units as effectively as shown in Fig. 4. This map also illustrates the survival of joint ownership of hill land. The consolidation of farms and the fixing of boundary fences when the rundale system was ended commonly stopped short at the head-dyke, and the distribution of ownership of the higher grazings was expressed, as the tenant rights had formerly been, in terms of soums, each soum being equal to the grazing of one cow with equivalents for other stock. Today there is little observance of the stated soums on many joint mountains, few cattle are put on the hill to balance the selective grazing of sheep, and there is little control over numbers of sheep.<sup>8</sup> The carrying of too large a total stock of sheep is common, and this

must not be confused with intensifying production; it is simply bad husbandry resulting in damage to pasture land. On joint mountains up-grading of stock, eradication of disease and improvement of the grazings is only possible by co-operation of all the owners and this is often difficult to get, so many are involved. Fig. 5 shows the extent of these joint grazings in the Sperrin Mountains. Their survival is nearly as marked in the eastern parts of the Antrim plateau, while in the Mourne Mountains hardly any of the hill pastures are grazed by a flock owned by one farmer. Reduction in joint ownership is proceeding only very slowly as shares pass into fewer hands, and further rationalizing of farm boundaries similarly only as neighbouring farms come under unified control.

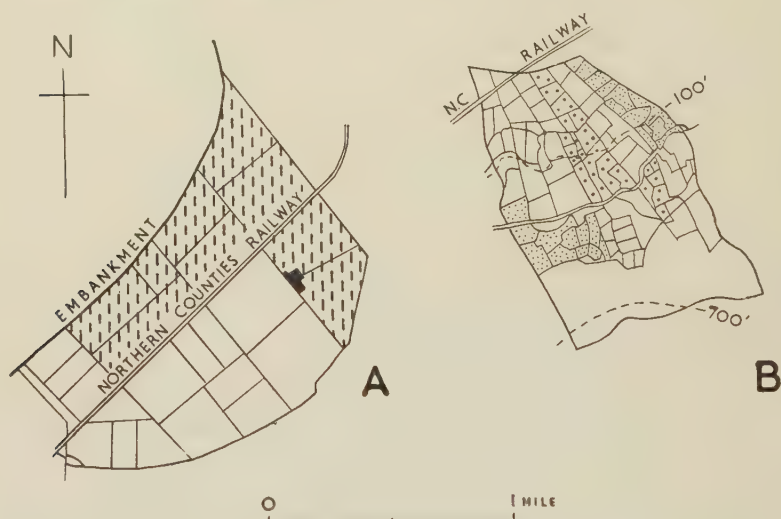


Fig. 3.—Lower Ballyleighery (B) is a townland on the slopes of the hills overlooking Magilligan Point. The very small fields and "striping" of the farm boundaries from low to high ground are typical of farms on land formerly held in rundale. In contrast, Ballykelly Level (A), land reclaimed from Lough Foyle after consolidation of farms had become normal, exemplifies the compact farm with large, regular fields. (Symbols indicate in each instance land belonging to one owner.)

#### METHODS OF INTENSIFICATION

In face of these peculiar difficulties as well as more general ones, the intensification of agriculture in Ulster is proceeding on the same two principles as are universally applicable, namely by ensuring the most efficient use of each acre of improved land and by the up-grading of land by reclamation and improvement. The methods employed to increase the efficiency of use of improved land are, in general, those applicable throughout the British Isles and recently described by Professor Duckham.<sup>9</sup> The penetration of revolutionary methods to the average farmer is slower than in Britain—combine harvesters and grain or grass drying plants are rare and probably will remain so because of the small size of farm unit—but steady progress is being

made with the less spectacular but more generally adaptable techniques. Improved grazing and feeding methods, breeding by selection, control of diseases, attestation of beef as well as dairy cattle, research into the use of fertilizers and hormone treatments are attracting the attention of more farmers. Most important is the interest shown in modern grassland husbandry. There is a striking geographical effect in the return, more rapid and more general than in Great Britain, to a grass acreage not dissimilar to that of the 1930's, but with sown grass mixtures increasingly common.

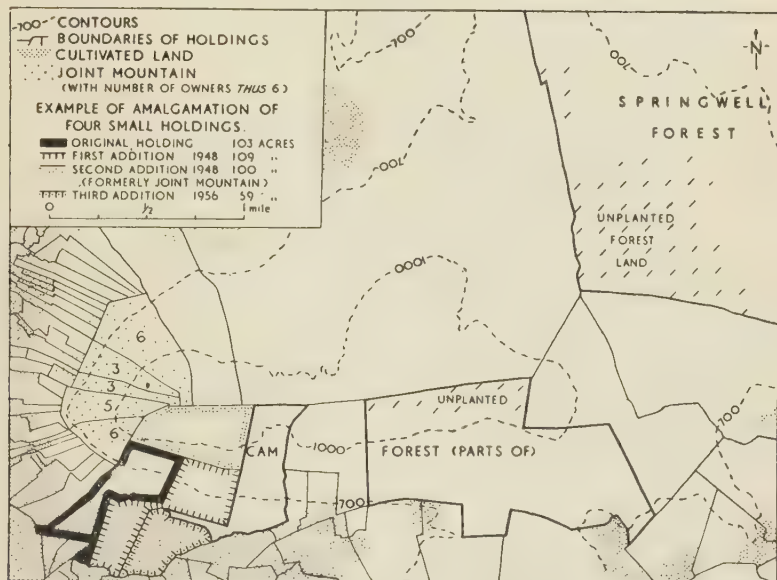


Fig. 4.—The creation of a farm of economic size and convenient shape by amalgamation. Small striped farms with little cultivable land, a large hill farm and forest areas also appear in this sample of land division, typical of the Ulster hill country. All farm boundaries are shown but individual fields are not distinguished. (Reproduced by courtesy of the Statistical and Social Inquiry Society of Ireland.)

### *Farm improvement schemes*

In land reclamation—the improvement of land which has never before been cultivated, or which has been neglected for fifty to a hundred years—and the accompanying renovation or replacement of farm houses, buildings and permanent equipment, Ulster has made great strides since 1945. Before the war there was a special reclamation scheme, conceived partly to relieve unemployment, and aiming at the drainage of good but neglected land, especially the more fertile pockets in hill country. The subsidy of £2 per acre introduced in 1938 for grassland brought under the plough also stimulated attention to neglected land and this was, of course, intensified during the wartime plough-up campaign. But impoverishment by continued cropping led the Ministry of Agriculture to direct many farmers after the war

to sow fields down to grass and apply appropriate fertilizers. Attention was then switched more especially to the improvement of hill land and the in-bye land which is essential for producing winter fodder for the stock-rearing farms. Payments of subsidies for hill sheep and hill cattle were authorized only on condition that some of the money was spent on improvements to the land. It cannot be pretended that these regulations were fully complied with, though subsidies were withheld from some farmers who grossly neglected their responsibilities. The Hill Farming Act, 1946, was the long-awaited invitation for hill farmers to go ahead with improvements on the grand scale, an invitation that was extended to the farmers of the slightly lower and less severe land by the Livestock Rearing Act, 1951. These were schemes devised in the first place for Great Britain but they were adopted without delay in Northern Ireland.<sup>10</sup> The high proportion of land in Northern Ireland of a type acceptable to the Ministry of Agriculture for help is indicated in Fig. 6, constructed to show (1) mountain land, i.e., all land suited only to grazing by hill sheep and in places hill cattle, generally over 800 feet in the east, and over 600 feet in the west; and (2) uplands regarded as marginal for cropping and, today, essentially livestock-rearing country. This category is generally above 400 feet but includes areas of rugged, though lower, land most of which is suitable only for similar use, this being mainly in Fermanagh and Tyrone. Lowland or basin bog, which is little used for grazing, is not included. Between 1946 and 1958, 672 improvement schemes were accepted, affecting over 126,000 acres. The reconstructed farmhouse, with neat walls, good access roads, and efficient buildings, sown pastures supporting attested cattle as well as sheep, good fencing and drainage, new pens and dippers, and shelter-belts, is now fairly common in the Ulster hills. But of the farmers eligible for such help only a small proportion have applied for it. Many have been deterred because this type of improvement scheme must be comprehensive, i.e., it must include all the work that the inspecting officers think necessary for renovation and efficient working of the farm. The farmer has to find only half the cost, but the average total outlay on Northern Ireland schemes has been about £1000, which, though small by Scottish standards, is not easily raised by small farmers on marginal land. Ulster farmers are traditionally reluctant to accept large loans from government schemes or banks, or to mortgage their holdings.

For farmers not undertaking comprehensive improvement but wishing to reclaim individual patches of land covered with gorse or heath, but judged capable of bearing crops or good grass, there has been a special scheme, peculiar to Northern Ireland. The Ministry of Agriculture has provided special heavy machinery which could break in land which, because of peat cover, rockiness or hard pan, presented too many obstacles for ordinary farm equipment to overcome.<sup>11</sup> At the peak period of the scheme six sets of machinery were at work. All are

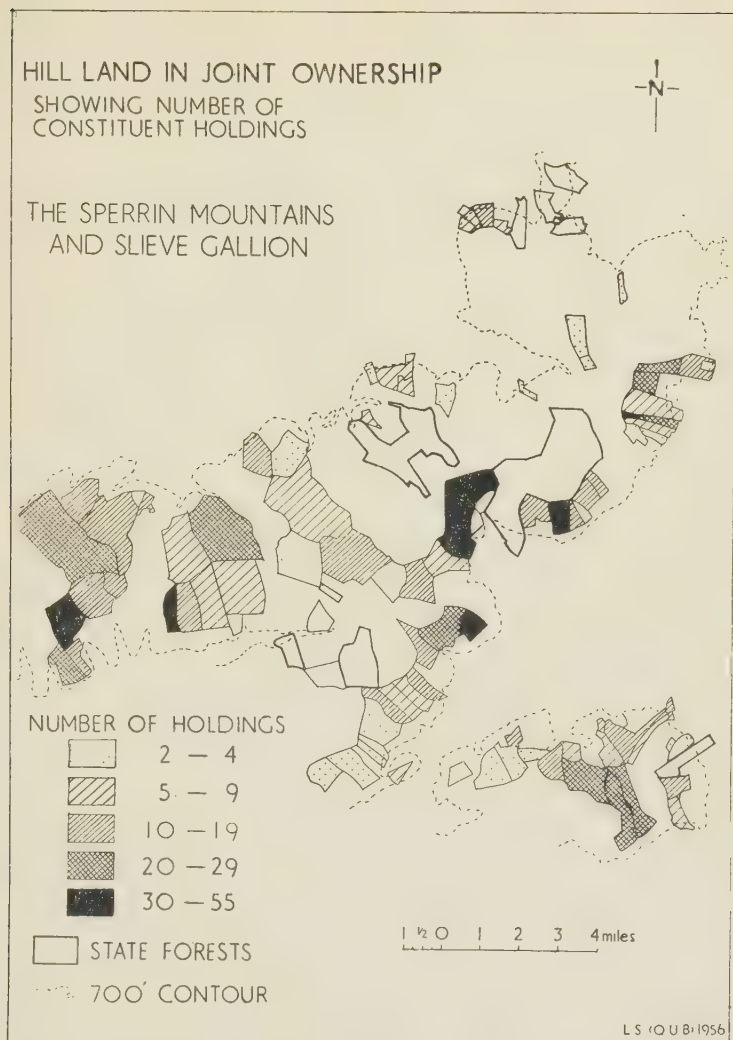


Fig. 5.—Joint grazing land in the Sperrin Mountains. Division of ownership between 20 to 30 persons is common, and this extends to quite small areas, as little as 200 or 300 acres of rough grazing, capable of supporting only about one ewe per two acres.

now scrapped or due for withdrawal and in view of the cost of replacement and the belief that a large proportion of the suitable land has now been treated it is not likely that the scheme will continue in its present form. It is also argued that contractors will be able to carry out the work more economically than could the government agency and grants will continue to be offered.

Other individual improvements of various kinds, including fencing, draining and fertilizing, have also been assisted by the State, with special schemes for the poor and heavy lands of Fermanagh and West

Tyrone which have been treated as areas of marginal land, justifying special measures distinct from the Livestock Rearing Schemes. Now, under the 1957 Farm Improvement Scheme, all farms in the province will be eligible for assistance in improving land and buildings, provided fairly stringent conditions are satisfied. This is a United Kingdom scheme, but before it was introduced Northern Ireland had its own Agricultural Development Scheme which had similar objectives. As it carried a 50 per cent grant against the new British Scheme's 33½ per cent, the Northern Ireland Government is paying an additional one-sixth from its own funds so that its farmers shall not be worse off under the new scheme than under the old. Then, too, there is the 1958 United Kingdom scheme for improving small farms. This is of great importance in Ulster because of the large number of small holdings, but its administration will cause great difficulties since many of the holdings are too small to be counted economically viable and will not therefore be eligible.

Ulster has lagged behind Britain in the modernization of farm houses, and the provision of utility services, and one of the ways in which the province is seeking intensification of its agriculture is by narrowing these gaps. The building of new houses, or extensive reconstruction work, has made particularly good progress since the war. Ulster has for some years had its own special housing-on-farms scheme run by the Ministry of Health and offering facilities alternative to and separate from those offered by the comprehensive farm improvement schemes. The large number of small farms makes rural electrification a formidable task, but 19,000 farms, about a quarter of all in the province, had been connected to the grid by the end of 1958, with an annual increase of about 2000 connections. Good piped water supplies are also becoming more general, but carrying of water from springs and wells is a time-wasting job still all too common on smaller farms.

Thus there is now a complicated range of schemes to help farmers to improve their land and buildings, and some of them are peculiar to Ulster, or modified for the needs of the province. There are still some farms ineligible for any general scheme, and many owners who have not yet taken advantage of their opportunities, but outside specific schemes for individual farms there are other ways in which the land is being improved to permit more intensive farming.

#### *Regional and arterial drainage*

Since 1947 Northern Ireland has been active in promoting drainage schemes. These include some large projects of regional significance, including the Bann, Erne and Quoile schemes. By lowering the level of loughs and clearing river beds of obstructions the local draining of many thousands of acres of agricultural land is being made more effective. It was estimated by the land drainage authorities that in the

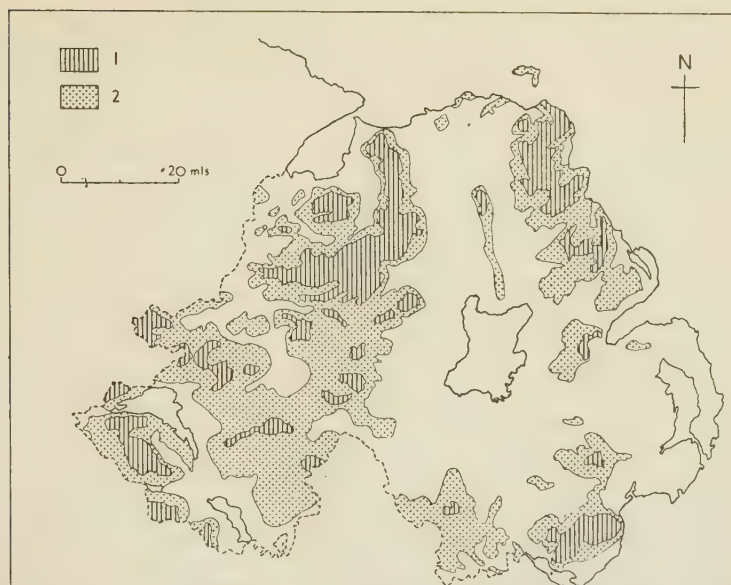


Fig. 6.—Land mainly suitable for livestock rearing. (1) Mountain and high moorland grazings. (2) Uplands suitable for store cattle and other livestock with limited cropping.

Lough Erne lowlands alone 11,000 acres of agricultural land have been subject to regular flooding, while a further 18,000 acres have frequently been waterlogged. The levels of the Erne lakes are now controlled by barrages and sluice gates and the river channel has been widened and deepened.<sup>12</sup> An even more ambitious scheme has now been commenced. This will use Lough Neagh as the balancing reservoir for its catchment area which includes well over one-quarter of Northern Ireland. Of the 1,000,000 acres of the basin about an eighth has been classified as regularly flooded or saturated land, and improvement of this land is being facilitated as work proceeds. Of more local but very great importance is the programme of arterial drainage work carried out on rivers subject to flooding. Between 1948 and 1959, some 400 miles of main watercourses were improved and it is estimated that the present programme will occupy another decade. Land reclaimed from the sea in Lough Foyle under the Irish Society during the nineteenth century is also receiving attention, for in some instances the protecting embankments have deteriorated and pumping of the sloblands has not been maintained, with the result that scarce first-class arable land has been reverting to useless marsh. Work has been completed on four miles of the embankments and will be extended over the whole. Until these major works improved run-off, local drainage was impracticable but this is now being speeded up by co-operation between government agencies and riparian owners in joint land improvement schemes.

It would be geographically satisfying to conclude by showing the differing contributions to the overall increases in production being made by each region or county. Unfortunately, there is no data on which maps or statistics can be based. Merely to compare numbers of livestock in each area in different years would be misleading because of the complex nature of stock movements. Cattle enumerated on June 1st in Antrim or Down may have been reared in one of the western counties and partially fattened in another, or they may have been imported as forward stores from the Irish Republic. All that can be said is that field observations and statistics of improvement schemes, applications for government grants, use of lime and fertilizers and similar indications suggest greater increases in the east and north of the province—Antrim, Down and Londonderry—than in the south and west. The former zone benefits from nearness to markets and ports and consequent lower transport costs. Not only are lesser distances to be overcome in the eastern and northern areas, but communications are better. The closure of almost all branch-line railways, including the connections to Armagh and Enniskilling, partially reflects the limited use made by farmers of railways in this age of road transport, but can only serve to increase the sense of isolation in these areas, for the thinning out of traffic westwards does not justify disproportionate expenditure on the roads which serve them alone. Rural electrification and water supply are more advanced in the eastern counties, while the air of prosperity conveyed by sound houses and buildings, tidy fields, gates and hedges, and well-fed livestock, is strikingly greater than in the west.

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# The Mid-Cheshire Salt Industry

K. L. WALLWORK

FROM THE TIME OF THE DOMESDAY SURVEY—and probably long before—the extraction of salt in its various forms has been the basis of the industrial economy of mid-Cheshire. The early history of the salt industry has been dealt with in several publications;<sup>1</sup> in this paper it is proposed to trace the development of the industry since the mid-eighteenth century. As in many areas dominated by extractive industry, the pattern of industrial location in mid-Cheshire has largely been conditioned by the geology of the mineral being exploited. The rock-salt deposits<sup>2</sup> are interbedded with the Keuper Marls of the Triassic syncline of the Cheshire Plain. Two major deposits of rock-salt are recognizable—the Upper and the Lower beds, which reach maximum thicknesses of between 80–90 feet in the Northwich area. In addition there are numerous thin veins of rock-salt below these major beds at varying depths throughout the saltfield. The Upper bed lies at a depth of 214 feet near Northwich, but elsewhere in mid-Cheshire it is found at depths ranging from 320 to 506 feet, due to faulting and to dip. Natural reservoirs of brine lie above the rock-salt beds: originally this brine issued from springs, but when these became inadequate to meet the demands of modern industry the practice was introduced of pumping brine to the surface for use in salt-manufacturing processes.

There are, in 1959, five principal salt and brine producing areas in mid-Cheshire: Holford, Middlewich, Northwich, Sandbach and Winsford (Fig. 1). Salt has also been manufactured at Church Lawton, Lymm and Nantwich from local brine, and at Frodsham and other points along the Mersey Estuary from sea water strengthened with mid-Cheshire rock-salt.<sup>3</sup> Although these peripheral developments have at various times been very important, or have promised to become so, throughout the entire period of industrial activity the mid-Cheshire saltfields have always been the core of the salt mining and manufacturing districts. They remain so today, even though salt is still produced off the saltfields, by plants located on the Mersey Estuary but deriving their brine by pipeline from Holfield.

## EARLY GROWTH 1670–1840

The period 1670–1840 witnessed the slow development of the salt industry from the scattered small-scale manufacture of white-salt, mainly for the inland market<sup>4</sup> to the extensive mining of rock-salt and manufacture of white-salt, largely for export. The early basis of the salt industry had been the manufacture of white-salt by the evaporation

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of brine from natural springs, using wood as fuel. By the seventeenth century the shortage of timber had forced the salt manufacturers to use coal, in spite of its high cost due to the inadequacy of communications between mid-Cheshire and the coalfields of south Lancashire and north Staffordshire. Consequently the salt proprietors began to seek deposits of coal in the vicinity of their works: none was found, but the search for coal revealed the existence of a bed of rock-salt, overlain by a natural reservoir of strong brine at Marbury, near Northwich, in 1670.

This momentous discovery did not immediately improve the prospects of the mid-Cheshire salt manufacturers, for it was more profitable to carry the rock-salt overland to the salt refineries of Merseyside, where coal was roughly 50 per cent cheaper,<sup>5</sup> than to bring coal to the salt mines. The mineral wealth of mid-Cheshire could not be exploited fully unless the means of communication between the saltfield and the Mersey Estuary were improved. The river Weaver had long been recognized as the best potential means of cheap transport between the two, and after a series of abortive attempts a Bill, sponsored significantly enough by the City Corporation of Liverpool,<sup>6</sup> was passed in 1721 to enable "the making of the river Weaver . . . navigable . . . from Frodsham Bridge in the County of Chester, to Winsford Bridge in the same county". The River Weaver Navigation was opened to traffic in 1732, and immediately became an integral part of the industrialization of mid-Cheshire: as the following table shows, "the Weaver was linked with an expanding industry, whose very expansion was linked with the Navigation".<sup>7</sup>

*Table I*

SHIPMENTS OF WHITE-SALT IN TONS ON THE RIVER WEAVER NAVIGATION 1732-1840<sup>8</sup>

1732	5,202	1777	31,000	1830	312,012
1744	8,279	1796	100,155	1840	414,156
1764	18,637	1820	186,666		

The canalization of the river Weaver was, however, only a partial solution to reducing the cost of coal in the salt districts, for it still had to be carried overland to the Mersey from Whiston and Prescott, where the coal owners were beginning to abuse their monopoly of the Liverpool and mid-Cheshire markets by raising the pit-head price of coal. The final solution came with the construction of the Sankey Canal in 1755,<sup>9</sup> which was built largely owing to "the want of coal at the salt-works".<sup>10</sup> The canal linked the newly developed coalfield around St. Helens with the Mersey Estuary, and thus with the Weaver Navigation (see Fig. 1). The importance of the Sankey Canal to the salt trade is clearly seen by the progressive increase in coal shipments to mid-Cheshire. In 1752 only 9,000 tons of coal were dispatched by the combined land and water route;<sup>11</sup> in 1806 107,040 tons of coal were shipped up the Weaver, of which roughly one-third went to Winsford, and the remainder to Northwich.<sup>12</sup> Holland also noted in 1808 that

the "flats", or sailing barges which carried the salt down to Liverpool, returned to mid-Cheshire via the Sankey Canal, bringing coal as return cargo. Thus developed a triangular trade linking the mid-Cheshire saltfield, the port of Liverpool, and the coalfield of southwest Lancashire, that was at least as important to the commercial growth of Liverpool as its more widely known contemporary between that port,

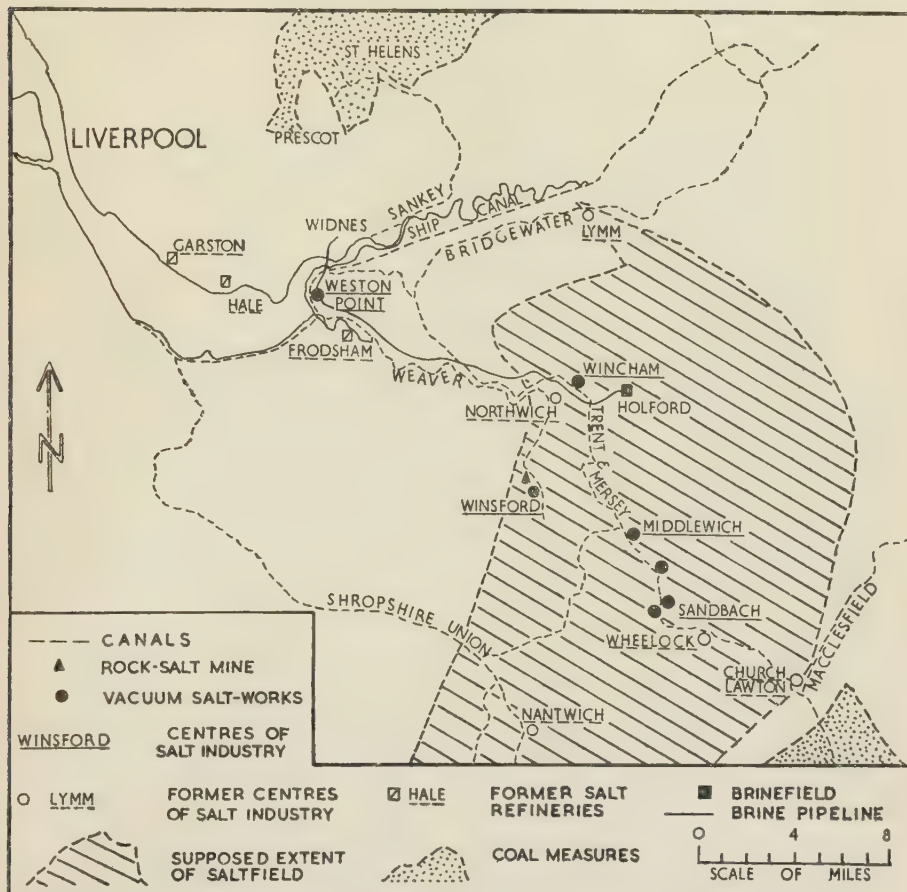


Fig. 1.—Salt manufacturing districts of Cheshire 1959. A recent series of borings suggests that the saltfield extends further west of Winsford than was hitherto supposed.

West Africa, and the West Indies.<sup>13</sup> The great mineral wealth of mid-Cheshire was now enhanced by its geographical position, and the industrial development of the saltfield was to be connected with that of south Lancashire and with the mercantile expansion of Liverpool throughout the nineteenth century.

#### THE PERIOD OF RAPID EXPANSION 1840–1888

The principal feature of the great phase of expansion between 1840 and 1888 was the rise to supremacy of Winsford as a centre of white-salt

manufacture. Northwich, which had been the premier salt town throughout the eighteenth century, remained the most important rock-salt mining district, but although its production of white-salt continued to rise also, it did so at a much lower rate than in Winsford. Middlewich and Sandbach were relatively insignificant centres of salt manufacture in 1840. Their reserves of brine, although later found to be considerable, were scarcely tapped, for both centres had communications inferior to those of Winsford and Northwich. The Trent and Mersey Canal, opened in 1777, linked Sandbach and Middlewich with the Mersey Estuary, but had three decisive disadvantages when compared with the Weaver Navigation: canal tolls were double those on the Navigation; the route taken was circuitous and passed through many flights of locks; and canal barges, unlike the Weaver "flats", could not navigate the tideway to Liverpool, thereby causing double handling of cargo at Runcorn where goods were transhipped to estuarine craft.

The growth of the mid-Cheshire salt industry after 1840 was mainly the product of the extensive trade directed from Liverpool and the rapid growth of alkali manufacture in southwest Lancashire, notably in St. Helens and Widnes. Ease of access via the navigable river Weaver was the key to both markets; so that the Navigation continued to form an integral part of the industrial structure of mid-Cheshire. This is clearly to be seen in the distributional pattern of salt-works and rock-salt mines throughout the period: the map (Fig. 2) shows the location of the salt industry in 1888, at the peak of its prosperity.

Winsford had become the major centre of white-salt manufacture in the 1850s (as Fig. 3 shows) mainly by capturing the lucrative East Indian market, opened to free competition after 1840, and by gaining much of the internal trade with the Lancashire alkali manufacturers. In 1888 roughly two-thirds of the salt pans of mid-Cheshire were at Winsford, in the great concentration of works that jostled for sites along the Weaver valley at the head of navigation. Northwich, the older salt-manufacturing centre, had made appreciably less progress after 1840. There were two main reasons for this. By virtue of its superior deposits of rock-salt Northwich had dominated the mining branch of the industry, which was the first section to be affected by a diminution in demand. There was in addition the damage caused to the fabric and to the morale of the industry by subsidence, which came early to Northwich, and was there more violent in its impact than elsewhere in mid-Cheshire.<sup>14</sup> The effect of subsidence was twofold: most of the rock-salt mines and many of the salt-works were destroyed by it; and those salt-works and mines which did survive the early subsidences, or were opened after them, lay mainly away from the ravaged valley of the river Weaver on the banks of the Trent and Mersey Canal, which was less useful as a mode of communication with Merseyside.

Fig. 2 clearly shows the results of this centrifugal scattering of the salt industry in Northwich, and the marked contrast between this pattern and the more compact industrial structure of Winsford. Salt production at Northwich had already begun to slacken off by 1888 (see Fig. 3), a fact largely explained by the circumstances outlined above, but also influenced by the early growth of a competitive new industry—ammonia soda manufacture<sup>15</sup>—which also used brine as its basic raw material.

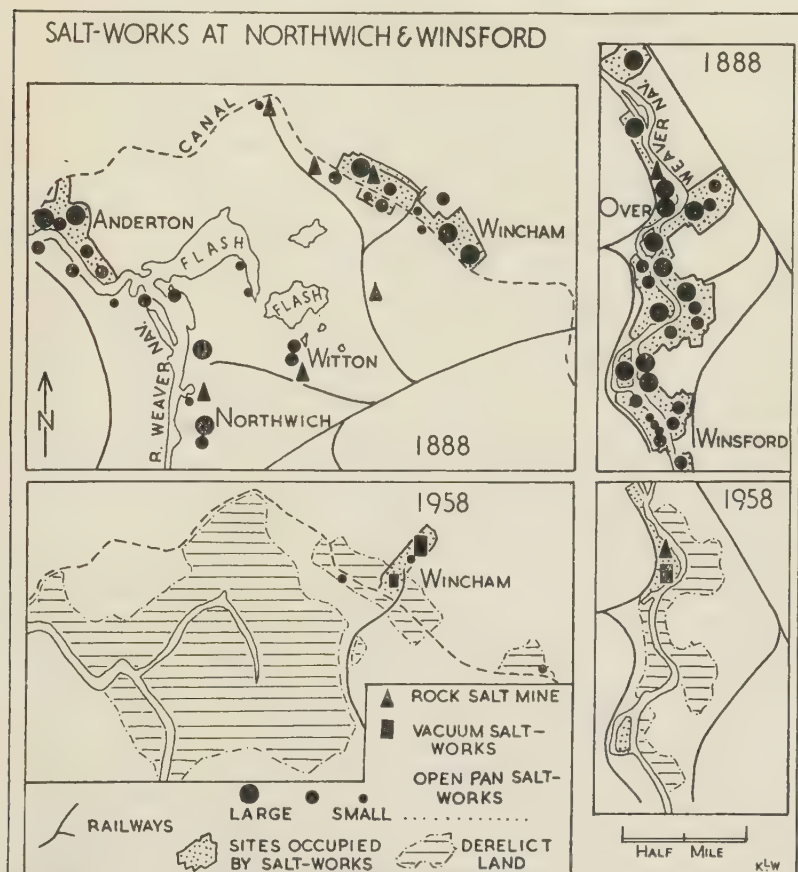


Fig. 2.—Salt-works at Northwich and Winsford in 1888 and 1958. Data for 1888 are from Home Office *Mineral Statistics of the United Kingdom*; for 1958 from field-work. The symbols for open-pan works are graded to indicate the approximate size of plant: small, under 10 open-pans; medium, 11–30 open-pans; large, over 31 open-pans.

The importance of the Weaver Navigation to the salt industry of mid-Cheshire is shown by the statistics of salt shipments for 1888 (Table II). In that year 65 per cent of the white-salt sent from the area was shipped by the Navigation; this constituted the bulk of the export trade, and much of the traffic with the southwest Lancashire alkali

works. The railways were next in importance, and had come into prominence since the 1860s\* to serve those markets that were inaccessible by water. The Trent and Mersey Canal was least important, for although it had been connected with the Weaver Navigation at Anderton by means of a barge lift opened in 1874, the traditional pattern of shipment by the Navigation had not been broken. This was particularly true of the traffic in rock-salt from Northwich, for in spite of the fact that most rock-salt mines lay close to the Trent and Mersey Canal, very little rock-salt was shipped by canal, and the bulk of the traffic still went by way of the Navigation.

The dominance of the Navigation, reflected both in the distribution of salt-works and in the pattern of salt shipments, was consistent with the industry's dependence on cheap carriage of its bulky materials—coal and salt. The open-pan method of white salt-manufacture was prodigal of fuel, and used from 10–13 cwts. of coal per ton of salt made. The cost of coal (3s. per ton of salt made) was over half the cost of production in 1882: brine pumping costs of 9d. per ton, labour costs of 1s. per ton, and general charges of 1s. per ton made up the remainder of the 5s. 9d. per ton ex-works commonly charged at that time. The shipment of salt to Liverpool via the Weaver Navigation cost 3s. 6d. per ton: rail freight charges varied considerably, but however short the distance a wagon hire fee of 1s. 6d. had to be paid.<sup>16</sup> Without the advantage of water haulage between mid-Cheshire and Liverpool on the one hand, and from the coalfields of southwest Lancashire and north Staffordshire on the other, it is doubtful whether the salt industry could have maintained its pre-eminent position for as long as it did. Even so, the subsequent fierce competition from other British saltfields that was soon to be unleashed revealed the many inadequacies of the salt industry in mid-Cheshire. The eighties were clearly years of great prosperity in mid-Cheshire: but what is now more clearly apparent is that they were also years in which the seeds of future destruction were sown.

#### CONTRACTION AND REORGANIZATION 1888–1938

The half-century between 1888 and 1938 saw many changes in the mid-Cheshire salt industry, not only in its structure and location, but also in its position relative to other salt-producing areas. In 1882 86 per cent of the nation's white-salt came from mid-Cheshire: by 1900 the proportion had fallen to 69 per cent, and by 1913 it had fallen to 49 per cent. During the period 1882–1913 the tonnage of white-salt manufactured in mid-Cheshire fell by 62 per cent (roughly one million tons). It was clear to the salt manufacturers during the eighties that all was not well with the industry, and in an attempt to stabilize trade

\* The principal lines serving the saltfield were the main L. & N.W.R. line through Winsford, opened in 1837; the Manchester to Northwich line, opened in 1863, with a branch to Middlewich and Sandbach in 1867, and to Winsford in 1870. The L. & N.W.R. branch in Winsford, serving many salt works, was opened in 1882.

a merger of the dominant salt firms, known as the Salt Union, was formed in 1888. The Salt Union comprised 64 firms from Cheshire, Staffordshire, Worcestershire, Northern Ireland, and the Middlesbrough district, which together produced 90 per cent of the nation's rock- and white-salt. A full account of the fluctuating fortunes of the Salt Union is beyond the scope of this paper,<sup>17</sup> but three factors which help to explain the continued contraction of the mid-Cheshire salt

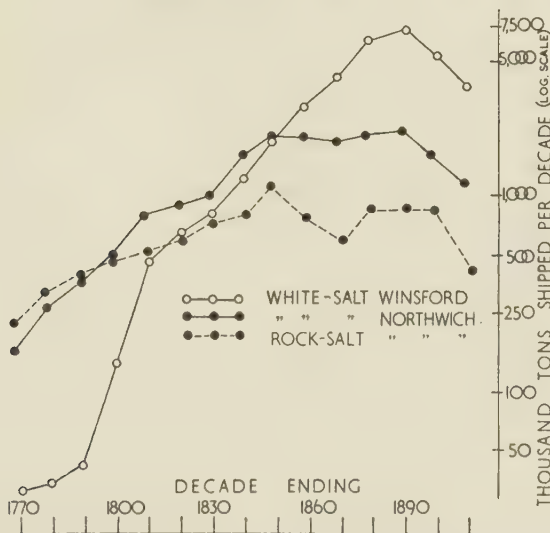


Fig. 3.—Tonnage of salt shipped down the river Weaver in each decade 1760–1910.  
Data from A. F. Calvert, *Salt in Cheshire*.

industry after the merger are worthy of note. First, the Salt Union did not have a complete monopoly of the salt trade, although it often behaved as though it had, with disastrous consequences for its already shaky financial structure. Second, the widespread occurrence of salt within the British Isles encouraged competitive firms to be set up whenever the Salt Union attempted to force up prices by restricting output. Even in mid-Cheshire, the stronghold of the Salt Union, several firms opened new works which were outside the control of the combine. Third, the suicidal competition for supremacy within the British salt industry allowed foreign competitors to enter those overseas markets—notably in Africa and India—which had previously been the preserve of British traders. Thus the importance of the salt industry as a whole declined after 1888, but the most severe decline of all took place in mid-Cheshire: the formation of the Salt Union hastened rather than arrested the contraction of the salt industry in mid-Cheshire, and by 1910 the salt manufacturers had reached yet another crisis in their history.

Between 1888 and 1910 the amount of white-salt shipped from mid-Cheshire fell by 48 per cent, and of rock-salt by 69 per cent. This

reduction of output was not equally shared by the salt manufacturing towns. Shipments from Winsford fell by 512,075 tons (53 per cent), from Northwich by 243,530 tons (67 per cent), and from Wheelock by 45,600 tons (66 per cent). On the other hand shipments from Middlewich *rose* by 109,000 tons, an *increase* of 1750 per cent! These great disparities were largely attributable to the different sets of geographical and economic factors which influenced the development of the salt industry in the three towns between 1888 and 1910.

The factors principally responsible for the decline of the salt trade at Winsford and Northwich were, first, the very considerable reduction in demand for coarse white-salt, the staple of the export trade, caused by competition from foreign and British manufacturers with lower costs of production, and second, the loss of the important domestic trade with the Leblanc alkali manufacturers of southwest Lancashire after 1890. The dominant Leblanc firm, the United Alkali Company, opened up the Fleetwood saltfield in that year, and by 1910 was able to supply all of the various works under its control. The loss of these two markets for cheap salt in bulk effectively dislocated the industry in Winsford and Northwich, for it was now over-equipped with obsolete plant, and there was no apparent hope of adaptation to the new economic climate.

Two features peculiar to Northwich were responsible for the more rapid rate of contraction in that district. The continued spread of subsidence had further dislocated the salt industry: not only had it destroyed several salt-works, but it had also inhibited capital expenditure on new plant and the re-equipment of old works. The competition of the alkali manufacturers of the area—notably Brunner, Mond—for the dwindling reserves of brine had at the same time gained momentum, and by 1910 the chemical industry had gained ascendancy in Northwich. In Winsford the severe contraction of the salt industry was almost entirely due to loss of trade. In 1905 hope was raised of a local industrial revival, with the construction of a modern vacuum evaporator plant—ininitely more efficient than the long-established open-pan works.<sup>18</sup> But even this hope was illusory, for the Salt Union later decided that the major vacuum evaporator plant that it was to build should be located off the saltfield. The site chosen, at Weston Point near Runcorn (Fig. 1), had a frontage to the Manchester Ship Canal and was entirely free from subsidence. The only obstacle to the project was a regulation controlling the amount of brine that could be conveyed by pipeline, which had strictly been enforced by the Salt Union in order to deter would-be competitors. The regulation had been applied with particular severity in small centres of salt manufacture, such as Middlewich, where the Salt Union did not establish itself but wished to restrict the growth of competitive firms. However, a complete *volte face* was achieved by the Salt Union in spite of opposition from municipal authorities on the saltfield, for in 1911

the Weston Point salt-works were opened, and were supplied with brine by a pipeline from Wincham (Fig. 1). This action sealed the fate of the salt industry in Winsford, just as the intervention of Brunner, Mond had done in Northwich, and both towns were to become progressively less important centres of the salt industry thereafter.

The growth of the salt industry at Middlewich after 1888 was paradoxically largely a product of its earlier insignificance, for although it was claimed that the Salt Union "have secured the best salt lands and sites for salt-works . . . (so) that would-be competitors have to take what is left",<sup>19</sup> it did not consider the properties which it held at Middlewich to be worth retaining. The withdrawal of the Salt Union from this district led to its exploration by several independent firms in search of brine, and considerable reserves were discovered which could be pumped from shafts alongside the canal and the railway. This was important, for salt-works had to be erected near the brine shafts, owing to the strict enforcement of the regulations which restricted the conveyance of brine by pipeline. In addition the Middlewich district was also then free from subsidence, and its salt manufacturers were not subject to the Brine Compensation Board levy that was exacted in Northwich.

The previous major disability of Middlewich—lack of direct communication by water with Liverpool—was now of little significance. After 1890 the salt industry of Middlewich grew mainly to supply the home market with fine quality white-salt, a branch of the trade in which the district had long specialized, owing largely to its inability to compete with Northwich and Winsford in the coarse salt export market. The new works at Middlewich were, therefore, equipped to serve the home trade from the outset, and they were not burdened by a surplus of obsolete capital equipment, unlike most of the Salt Union's works. The same was substantially true of the Sandbach area. Here the Salt Union owned open-pan works at Wheelock (Fig. 4) which were closed during the 1920s: at the same time new vacuum evaporator works were erected by firms independent of the Salt Union on comparable rail- and canal-side sites at Elworth. Thus a combination of physical and economic factors was largely responsible for the growth of salt manufacture in the south-eastern part of the saltfield, but even so the salt trade of the district as a whole continued to diminish after 1910: the rise of the industry in Middlewich, and later in Sandbach, failed to compensate for its contraction in Winsford and Northwich.

These shifts in the location of salt manufacture also produced changes in the pattern of salt shipment. Although the tonnages of white-salt handled by each mode of transport fell appreciably between 1888 and 1913 (see Table II), the greatest reduction was of shipments by the Weaver Navigation. These fell by 64 per cent, compared with reductions of 48 per cent and 47 per cent by the railways and the Trent and Mersey Canal respectively. The decline in relative importance of the

Table II

## SHIPMENTS OF SALT IN TONS 1888 AND 1913

	1888				1913			
	Rail	Trent and Mersey Canal	Weaver Navigation	Total	Rail	Trent and Mersey Canal	Weaver Navigation	Total
White Salt								
Middlewich	1,151	5,085	0	6,236	90,528	28,361	0	118,889
Northwich	114,244	71,372	175,361	360,977	14,608	28,173	36,946	79,727
Wheelock	5,676	63,260	0	68,936	5,096	18,261	0	23,357
Winsford	233,074	0	735,770	968,844	75,810	0	292,044	367,854
Mid-Cheshire	354,145	139,717	911,131	1,404,993	186,042	74,795	328,990	589,827
Rock Salt								
Northwich	42,950	3,195	94,164	140,309	26,735	242	30,205	57,182
Winsford*	139	0	22,826	22,965	0	0	0	0
Mid-Cheshire	43,089	3,195	116,990	163,274	26,735	242	30,205	57,182

## MEANS OF TRANSPORT OF SALT AS PERCENTAGES OF TOTAL SHIPMENTS FROM INDIVIDUAL CENTRES 1888 AND 1913

	1888				1913			
	Middlewich	Northwich	Wheelock	Winsford	Middlewich	Northwich	Wheelock	Winsford
White Salt								
Rail	19	32	8	24	76	13	21	21
Trent and Mersey Canal	81	20	92	0	24	36	79	0
Weaver Navigation	0	48	0	76	0	46	0	79
Rock Salt								
Rail	0	31	0	0.5	0	47	0	0
Trent and Mersey Canal	0	2	0	0	0	0.5	0	0
Weaver Navigation	0	67	0	99.5	0	52.5	0	0

\* Rock-salt was mined at Winsford between 1844 and 1895; working was not resumed until 1928. Data are from Home Office, *Mineral Statistics of the United Kingdom*, London, 1888 and 1913.

Weaver Navigation was clearly a product of the diminishing export trade of Winsford and Northwich, just as the growth in relative importance of the railway reflected the increasing significance of the home market.

The development of the mid-Cheshire salt industry between 1910 and 1937 merely emphasized the trends which had become apparent after 1888. A marked contrast, which is clearly discernible today, developed between the salt-manufacturing towns. Northwich continued to wane as a centre of the salt industry, and became increasingly dependent on the more stable chemical industry. Winsford remained a salt-manufacturing town, but its importance diminished year by year as more salt-works were closed, and no new industry of any magnitude came to replace them. Middlewich and Sandbach on the other hand had three new vacuum evaporator works built between 1923-8, but as if to compensate for this the chemical industry in both towns diminished in size after 1930. Thus emerged the modern pattern of industrial distribution on the saltfield, with the chemical industry mainly around Northwich, salt manufacture principally in Middlewich and Sandbach, and vestiges of the salt industry in Winsford.

#### RECENT TRENDS AND RE-ADJUSTMENTS 1938-1959

In 1937 the Salt Union was absorbed by Imperial Chemical Industries in a merger which was ostensibly intended to achieve "stable conditions, good labour relations, reasonable prices, and steady technical improvements".<sup>20</sup> In addition it was in the best interests of I.C.I. to secure the extensive brine pumping rights of the Salt Union from competitors in the chemical industry, and this may have been the most important consideration. In the event I.C.I. achieved all but the first and most important of its stipulated aims—"stable conditions"—for the salt-works acquired by the company continued to close after 1937 and there are now very few left in mid-Cheshire. This recent contraction has been largely due to the same features as before: reduction in demand for coarse salt, increased costs of production by the open-pan technique, extension of subsidence, and the increasing influence of the chemical industry. It remains to note the effect of these most recent changes in the location of the salt industry, and to assess the effect of continued contraction of salt manufacture on the life of mid-Cheshire.

As Fig. 2 shows, Northwich now has few salt-works. Although a contrary opinion has recently been expressed<sup>21</sup> Northwich is no longer a salt-manufacturing centre of consequence, for the bulk of the brine pumped in the locality is used as a raw material of chemical manufacture. The largest salt-works is a vacuum evaporator plant built during the 1920s, on a site that was not controlled by the Salt Union. The firm is an independent one, and its success in an area which has seen so many failures is adequate testimony of the adverse influence of the Salt Union on the salt trade of mid-Cheshire.

The contraction of the salt industry at Winsford is now almost complete. The open-pan works have closed down, largely because a new technique of manufacturing coarse salt by the vacuum evaporator process has now been devised.<sup>22</sup> One salt-works—operated by an independent concern—closed in 1958 because it was unable to comply with the Clean Air Act, a piece of legislation which may well completely remove the open-pan salt-works from the industrial landscape. Winsford retains the only rock-salt mine still working in the British Isles. It was hurriedly reopened in 1928, when the last salt mine in the Northwich area was destroyed by subsidence. A new shaft was sunk in 1941, and the mine now produces roughly 50,000 tons of rock-salt per year. The renewal of rock-salt mining provides the only local element of industrial expansion in recent years. In contrast the white-salt section at Winsford has contracted, not only through the abandonment of the open-pan process, but also by ceasing to produce vacuum evaporator salt for household use. As if to emphasize the almost complete loss of the once lucrative export trade, the headquarters of the Salt Division of I.C.I. were recently moved from Liverpool to Winsford, thus breaking a centuries-old link between the saltfield and its major commercial and mercantile centre. A similar change is to be seen on the river Weaver, where the fleet of salt boats has been drastically reduced, and no new vessels have been commissioned for many years.

*Table III*  
INSURED WORKERS IN THE SALT INDUSTRY 1949 AND 1957

	1949	1957	Increase (+) or Decrease (—)	Salt workers as a percentage of the insured population	
				1949	1957
Mid-Cheshire	3,366	2,706	—660	10%	7%
Middlewich	827	824	+ 15	15%	15%
Northwich	331	311	— 20	2%	1%
Sandbach	543	629	+ 86	11%	11%
Winsford	1,665	924	—741	42%	22%

Data, from *Ministry of Labour and National Service*, are for workers in industrial group SH which in mid-Cheshire is confined to salt workers. The group includes categories not represented locally, e.g., workers in oil shale mines and at oil wells.

Note in particular that although salt manufacture is still relatively important in Winsford, the industry has declined absolutely and relatively in the town since 1949. In addition the traditional centres, Winsford and Northwich, now have a smaller labour force engaged in the salt industry than the “new” centres, Middlewich and Sandbach.

In Middlewich and Sandbach the salt industry continues to prosper (Fig. 4) although even here output has recently diminished, mainly in the open-pan section of the industry. No significant changes in location have taken place since 1938, for the single new works built since then conforms to tradition by occupying a railside site near to the canal. Much of the output from this area is for the household market, and in the absence of the Salt Union and its successor I.C.I., the local salt industry has progressively come under the control of Cerebos, a firm

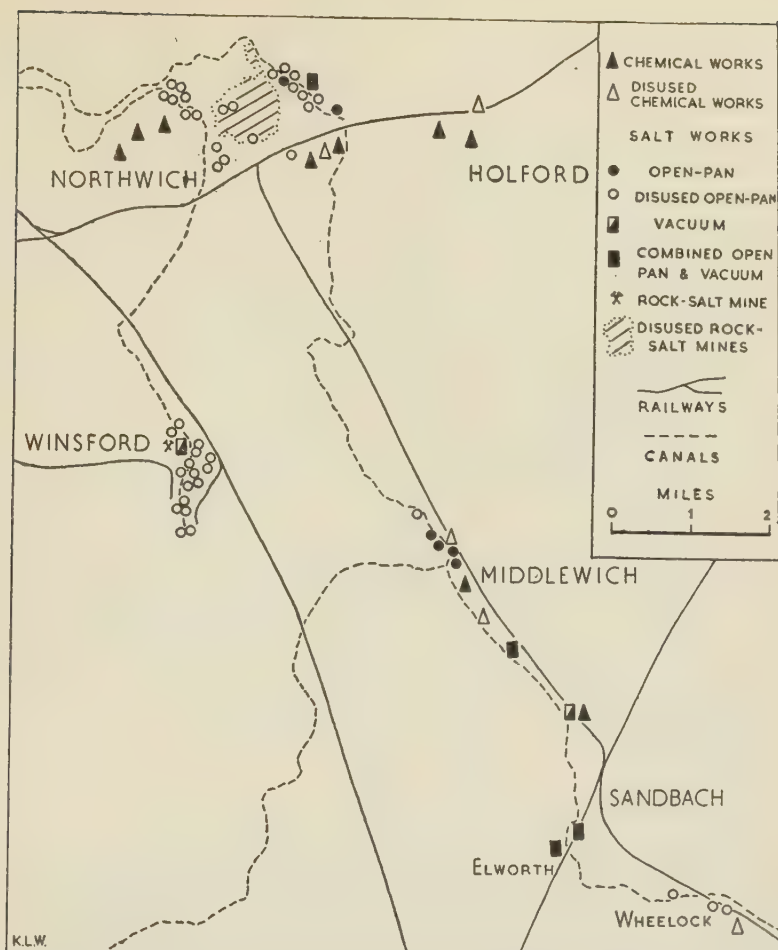


Fig. 4.—Salt and chemical industries of mid-Cheshire, showing all the sites occupied by salt or chemical manufacture between 1888 and 1958. The concentration of the chemical industry around Northwich, and of the salt industry in Middlewich and Sandbach, is a noteworthy feature of the modern pattern of distribution.

with origins on the south Durham saltfield, and well known for its household salt. Thus the longstanding importance of Middlewich and Sandbach as centres of fine salt manufacture has helped to maintain their industrial prosperity, just as the concentration of coarse salt manufacture in Winsford and Northwich contributed to the decay of the industry there. The main function of these recent trends has been to emphasize more clearly than ever the emergence of Middlewich and Sandbach as the dominant salt-manufacturing centres in mid-Cheshire.

In conclusion reference should be made to the impact of the contraction of the salt industry on the life and landscape of mid-Cheshire. The contraction of a staple industry normally brings in its train social and economic consequences which affect the environment of the

decaying industry and disrupt the life of the community dependent upon it. Fortunately the social consequences of industrial decay have not been as grave in mid-Cheshire as they have been in other parts of Great Britain. The rapid growth of the chemical industry was largely responsible for this state of affairs, first in the Northwich area, and more recently in solving many of Winsford's unemployment problems. As Table III shows the greatest reduction in employment of salt workers has taken place in Winsford with a fall of 45 per cent (741 workers) between 1949 and 1957. The solution of this problem has been to transfer salt workers to the chemical plant of I.C.I. at Northwich; this in effect gives them continuity of employment with the same firm. Although this has involved workers in a lengthy and moderately expensive daily journey to work,<sup>23</sup> it has meant the transformation of Winsford into a hybrid town—part industrial centre, part dormitory settlement (see Table IV)—instead of its becoming a “ghost” town.

Table IV

RELATIONSHIP BETWEEN PLACE OF WORK AND PLACE OF RESIDENCE  
WINSFORD URBAN DISTRICT 1921 AND 1951

	<i>Resident in the U.D. but working elsewhere</i>		<i>Working in the U.D. but resident elsewhere</i>	
	1921	1951	1921	1951
Total	960	1,895	400	622
including workers in				
Crewe M.B.	25	84	..	..
Middlewich U.D.	75	524	..	96
Northwich U.D.	77	795 <sup>a</sup>	45	56
Northwich R.D.	578	163 <sup>a</sup>	224	314
Sandbach U.D.	..	125	..	..

Net Outward Movement: 1921—560; 1951—1,273.

.. indicates data not available for movement of less than 25 workers.

<sup>a</sup> In 1921 the major chemical works at Northwich lay in the Rural District; a change of boundary in 1934 brought them within the Urban District.

Data for 1921 are from *Census of Population, Workplaces*, London, 1925.

Note that the statistics for 1951 (derived from *Census of Population, Report on Usual Residence and Workplace*, London, 1956) ante-date a period when many salt-works were closed in Winsford, and the daily outward movement is now (1959) even greater.

The product of seventy years industrial decay is clearly visible in the contemporary landscape of mid-Cheshire, where many formerly prosperous industrial zones are now a wilderness of subsidence “flashes”, abandoned mine shafts, the ruins of salt-works, and extensive tracts of derelict land covered by scrub and rough vegetation. In the Northwich area the “flashes” and the derelict land surrounding them have long been used for the deposition of waste from the chemical works, but even this usefulness does not make subsidence a blessing in disguise. But there are already signs that something may be retrieved from these areas of chaotic dereliction. For example at Winsford, where the problem of subsidence is less acute, one small new factory has already been built on a site vacated by the salt industry, and in the Northwich area some attempts are being made to tidy up the derelict areas around the “flashes”.<sup>24</sup>

In a wider context the decay of salt manufacture in mid-Cheshire is interesting on at least two counts. It was the first British industry producing a cheap commodity for sale in bulk to markets with a low average purchasing power to be outstripped and undercut by foreign competitors. What happened to the mid-Cheshire salt industry between 1888 and 1913 was subsequently to happen to the Lancashire cotton industry, with far more devastating consequences. But the same general aspects of decay were common to both industries: over-production, failure to adopt modern manufacturing techniques, and the existence of internal trade rivalries combined with mercantile complacency. In other words the often-lauded advantages of "the early start" were dissipated in a period of unconstrained industrial recklessness. The second point is the fact that apparent industrial decay is not always accompanied by social and economic disruption. The contraction of the salt industry in mid-Cheshire was mitigated by the rise of the chemical industry, which developed along refreshingly vigorous lines, in contrast to the narrow reactionary progress of the salt industry, which was partly responsible for its decay. Thus the mining of rock-salt and the manufacture of white-salt was replaced by the growth of the chemical industry throughout much of mid-Cheshire, but the basis of the economy remained the same. Salt, the raw material common to both of the staple industries in mid-Cheshire, remains the key to its prosperity and future development.

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- <sup>11</sup> T. S. Willan, *op. cit.*, pp. 39-40.
- <sup>12</sup> H. Holland, *General View of the Agriculture of Cheshire*, London, 1808, p. 72.
- <sup>13</sup> For a brief outline of the trade of Liverpool at this time see F. E. Hyde, "The growth of Liverpool's trade", in W. Smith (ed.), *Merseyside, A Scientific Survey*, Liverpool, 1953, pp. 148-63.
- <sup>14</sup> For an account of subsidence see K. L. Wallwork, "Subsidence in the mid-Cheshire industrial area", *Geogr. Journal*, vol. 122, 1956, p. 42. Figure 7 (p. 52) shows the effect of subsidence on the salt industry between 1877 and 1953.

- <sup>15</sup> Founded by Brunner, Mond at Winnington in 1874: for an outline account see *Merseyside, A Scientific Survey*, pp. 251-61.
- <sup>16</sup> Data from Home Office, *Mineral Statistics of the United Kingdom*, London, 1882.
- <sup>17</sup> For a full account see A. F. Calvert, *The History of the Salt Union*, London, 1913.
- <sup>18</sup> For an outline of the two techniques see *I.C.I. Magazine*, November 1948.
- <sup>19</sup> Salt Trade Correspondent of the *Northwich Guardian*, review of the year 1888 (January 1889).
- <sup>20</sup> *ICI Magazine*, November 1948.
- <sup>21</sup> In *The Historical Atlas of Cheshire*, ed. D. Sylvester and G. Nulty, Chester, 1958; the text (p. 60) and the map (p. 62) give a false impression of the relative importance of salt-manufacturing centres by including brine used in chemical manufacture as an equivalent weight of white-salt when calculating the output of the various salt-producing areas.
- <sup>22</sup> *ICI Magazine*, September 1953, gives explanatory semi-technical details.
- <sup>23</sup> The journey by bus to the various chemical works at Northwich costs between 10s. od. and 12s. 6d. per week, according to point of origin in Winsford.
- <sup>24</sup> The writer's account of the problems and progress of reclamation of derelict land in mid-Cheshire will appear in *Geographical Journal*, vol. 126, March 1960.

## Television Broadcasts in Geography

G. H. GOPSILL

TELEVISION BROADCASTS have been available in schools long enough now for us to enquire how effective they can be in the teaching of geography, and what particular qualities they possess which are not present in other educational situations. An indication of the especial qualities to be found in television broadcasts is given in the educational reports of the British Broadcasting Corporation and the School Broadcasting Council (1954). The S.B.C. Report spoke in these terms:—

“The strong attraction which television obviously has for children in their homes not only lays upon us a duty to explore how so powerful an influence may be turned to advantage educationally, but is ground for confidence that the medium has qualities which could be usefully used in education.”<sup>1</sup>

Since then distinctive qualities have been observed in:—

1. The introduction of persons of exceptional eminence in their own field, viz., scientists, explorers, and others of international reputation who can speak with authority.
2. The power to inspire by bringing to the children's notice standards of excellence accompanied by informed criticism.

➤ Mr. Gopsill is a lecturer in the Department of Education of the University of Nottingham. Acknowledgements are made with thanks to the City of Nottingham Education Committee for kind permission to enter their schools, to the School Broadcasting Council for their courtesy in making available a recorded version of the television programme “Wool in Australia”, and to those students of the Department of Education in the University of Nottingham who undertook the work in the schools.

3. The range of resources which the television producer can command.
4. The presence of a commentator or a narrator who occupies a dominant position before the viewers. The personality of this dominant figure may be a decisive factor in the success achieved by a broadcast. It is possible that children are more ready to respond to an agreeable personality; that this response arises from a feeling of personal relationship between viewer and broadcaster; learning is more likely to take place as a result of this favourable attitude; and consequently the educational force of the broadcast is enhanced.
5. The fact that television broadcasts are received by the viewers simultaneously with their production. They possess an element of *immediacy* which is unique.
6. The power to present recent events or contemporary problems while they are still *topical*.

The report of the School Broadcasting Council has this to say about these last two points:—

“Television deals with a more immediate present than a film can. It can show things actually happening as they happen. This impressed the conference as one of its most outstanding qualities and they felt that television’s power to show the ‘here and now’ of things at the actual moment would be a great educational asset.”<sup>2</sup>

Some of these characteristics might be scrutinized more closely. This article examines the qualities mentioned in points 4, 5, and 6 above with the special intention of seeing how far the educational merit of a geographical broadcast must depend upon the qualities of *immediacy* and *topicality*, or conversely, whether a broadcast can be considered effective when these elements are absent. First, a word should be said about the use of the terms themselves. Different observers have used these terms in different ways. Sometimes they are used to describe the same thing. On other occasions *immediacy* has been used to imply a quality of directness, that is, “a freedom from any intermediate agency”, meaning in this case the sense in which the broadcaster speaks directly to the viewer, and in so doing brings the viewer into a closer, more intimate relationship with the broadcast situation. It is this quality which is implied in point 4 above. It might help to avoid confusion if these terms could be defined more precisely. The following definitions are suggested:—

1. The dictionary definition of *immediacy* is the condition of being immediate in time. Therefore when used in connection with a television broadcast the term should describe only that condition which enables the viewer to see the programme simultaneously with its production.
2. That element of a television broadcast which contains temporary or local interest persisting only for a short while, should be described as *topicality*.

3. That quality of a broadcast which brings the viewer into closer relationship with the broadcast situation might be described appropriately as *intimacy* or *directness*.

In order to collect more information on these matters arrangements were made to view broadcasts with classes of children in schools. The notes which follow describe these observations and the conclusions which are drawn from them.

In a programme entitled "The Eskimos" in the B.B.C. series "Living in the Commonwealth", a distinguished narrator described the background of contemporary life among these people. His studio equipment consisted of a large wall map and various exhibits. Extracts of film were shown to illustrate points in his narrative. After viewing this broadcast, children were invited to discuss the programme; later they were tested for their knowledge of fact.

Subsequently a comparable class was shown the film "Eskimo Hunters" in "The Earth and its Peoples" series (Gaumont British Distrib.). This film is designed to describe for children in secondary schools the way of life of the Eskimo people, the environment in which they live, their adaptation to it, and to show how the traditional pattern of their lives has changed in recent years. The class is introduced to an Eskimo family by two native children with whom they accompany the father while hunting, enter the family home and see all the details of domestic life. The whole family sets out on a visit to a trading post and this gives an opportunity to demonstrate the Eskimo's changed economic status. Later on father and son depart on a hunt for caribou. After viewing, the film was discussed with the children and they were tested for their knowledge of fact.

The film was also shown later to those children who had already seen the broadcast and whose knowledge of it had been tested. This was done in the hope that these children would compare the two experiences and reveal their reactions in discussion.

The results of these tests and the discussions suggest that both these experiences were informative, but of the two the children enjoyed the film rather more. In it Eskimo life stands revealed. The device of using a couple of native children as guides appealed to the children in the class, helping to create for them the illusion of personal participation in the Eskimo's daily routine. The children themselves are quite clear on this point. Those who had seen both broadcast and film expressed their preference for the latter on the ground that it was more personal, more intimate, more exciting and more revealing in that it showed the life of a real family without interruption. This liking for continuity has occurred frequently in children's comments on broadcast and film. Conversely, they have often expressed a dislike for the fragmentation that occurs when in a television broadcast the presentation moves too often back and forth between narrator, studio, and film extract.

It would appear that this film was rather more powerful in evoking atmosphere and creating geographical background. It seems that the quality of *immediacy* in the broadcast has not produced on this occasion an educational situation which is more instructive or more calculated to evoke a favourable response than the film in which *immediacy* does not exist. The quality of *intimacy* created for the children through the personalities of the two Eskimo children in the film was more real for them than any feeling of intimacy which might have been derived from the broadcast.

It was felt that the impressions gained from the comparison of these two very different educational experiences should be re-examined in more carefully controlled conditions. Tests were made with four different but comparable second-year classes of 36 children each, aged 12-13 years. The television broadcast "Wool in Australia" was chosen for the subject and the following procedure was adopted. Group 1 viewed the live broadcast. To group 2 a 16 mm. recording of the broadcast was screened five months later. The same recording preceded by a period of teaching was screened to group 3. The first part of the sound film "The World's Wool" (Gaumont British Instructional), also preceded by a teaching period, was screened to group 4.

The broadcast which is concerned with the production of wool in southeast Australia is introduced by a commentator with the help of maps and studio exhibits. There is a brief historical note on the introduction of the merino into Australia. The routine work of a sheep station is demonstrated, viz. lambing, dipping, shearing, branding and finally the auction of the wool at the wool exchange in Sydney. The dangers of drought and other hazards are mentioned. The presentation is shared between studio situations and extracts from sound film. The narrator appears from time to time with explanatory comments serving as a link between the various components of the programme.

The sound film "The World's Wool" describes the seasonal work of a typical sheep station. It was chosen because it is the source of many of the film sequences used in the broadcast. Identical sequences appear in each; but whereas in the broadcast these sequences are interspersed with other sequences taken from other sources, in the film they remain in their context of the narrative of the film as a whole.

Each group was tested for their knowledge of fact two days after screening. The test of twenty questions was made objective by devising questions requiring one word only for each answer. Teaching and testing were done by different persons. It was found impracticable to use the same test for both broadcast and film which had a great deal in common, but also much mutually exclusive matter. A single test confined to the elements common to both would have left a substantial part of each untested. Therefore two separate tests were devised, similar in character to one another, and covering the principal

items of film and broadcast. After the tests the children undertook a piece of written work which would allow them to describe freely what they had seen and which might reveal knowledge not covered by the tests. It was also thought desirable that they should have opportunity for imaginative interpretations of their own choosing. This written work was prepared by persons who had not taken part in the testing. It took the form of a letter addressed to a friend in Britain, written by each child imagining himself to be an immigrant to Australia now living on a sheep station, and describing the new life which has just been revealed to him.

In making a comparison between teaching methods attention must be drawn to the fact that although educational conditions on different occasions may be similar, they can never be identical. For example, the composition of the groups may be controlled in a respect of age, sex, intelligence, and to a lesser degree, academic attainment. But there are bound to be other variations between individuals which are not subject to control. One cannot be absolutely sure for instance that all the children have the same background of knowledge to start with. Nor can we say with absolute truth that when we test for facts learned, all the knowledge which provides their answers has been learned from the film or the broadcast. It is at least possible that some of it may have come to them in other ways. Differences in teaching methods in the schools from which the groups were drawn will also tend to produce variations in performance. In fact, it is considered that the selection of the four groups used here did produce conditions sufficiently similar for our purpose.

In analysing the results, we see a close similarity between group 1 (live broadcast) and group 2 (recorded version). Both these groups received the same treatment. Introduction was confined to general comments on the nature of the subject about to be seen, and no formal teaching was done afterwards. Thus it was hoped that the questions asked later would test knowledge derived from the broadcast and not from teaching based upon it. Both groups achieved satisfactory scores. Therefore it is reasonable to assume that facts were learned. The similarity between the results shows that they were learned equally well from the recording as from the live broadcast. This suggests that the educational merit of the broadcast (in so far as facts are learned from it) had not weakened with the passage of time. If it was effective as an educational instrument on the day when it was first given it was no less so five months later. This would appear to mean that in this type of broadcast (i.e., straightforward illustrative matter which relies much on film extracts) the qualities of immediacy and topicality are less important in learning than lucid exposition and interesting illustration.

It is interesting to notice that the educational value of the broadcast is maintained in the recording in spite of the fact that the viewing

conditions are those normally associated with 16-mm. sound film. The use of the projector and the large screen and the physical arrangement of the room all go to create the atmosphere appropriate to film viewing. The children of group 2 were aware of this and although they knew that they were about to see a recording of a broadcast, for them it appeared on the screen as a film and they accepted it as such. Any educational benefit which might have derived from the intimacy of the television broadcast situation was retained. Their reactions to the personality of the commentator and to the friendly informal atmosphere created by him were the same as those of the children in group 1.

Table I  
MARKS OF TEST

Mark	Group 1	Group 2	Group 3	Group 4
20 (Maximum)	—	—	1	1
19	—	—	1	3
18	1	1	4	6
17	2	2	5	7
16	5	4	9	9
15	4	5	6	5
14	6	4	4	2
13	8	8	2	1
12	3	5	2	1
11	4	2	1	—
10	2	1	1	1
9	1	2	—	—
8	—	1	—	—
7	—	1	—	—
Median mark	13.5	13	16	16

Comparing the results of group 3 (recorded broadcast + teaching) and group 4 (sound film + teaching), both groups have similar results in the test for the recall of fact. Therefore in so far as educational merit can be measured in terms of factual recall we can assume that it has been derived as much from the recording as from the film. We must also remember that in these groups the whole educational situation was being tested, that is, the teaching situation in which the recording and the film both served the subordinate purpose of illustrating a planned lesson. New material was not introduced in this teaching; but since the teacher had the opportunity to preview it was possible for him to emphasize significant points. This is the natural advantage enjoyed by the user of film and in this case the same advantage was enjoyed by the user of the recording also, and its value is revealed in the higher scores obtained by the children in these groups.

We should now consider the written exercise. It was hoped that this would reveal the extent to which the general geographical background of the events of the screen had impressed the viewers; how strongly their imagination had been stirred; to what extent they had been able to enjoy the illusion of participating personally; how closely they had been brought into contact with the Australian scene. In all groups most of the children kept closely to description and they tended to

describe the same things. Particular incidents captured their attention, usually those incidents which were exceptionally exciting or dramatic or expressed with some force; or which aroused a strong emotion, of sympathy for example, of wonder or indignation. The sequences which showed the skill of the dogs in mustering, the irrational behaviour of the sheep, the enforced baths in the dipping troughs, the sheep dying in the drought, the exhausted creatures being lifted on to the drover's saddle, the animated scene in the auction room were especially noticed by everyone. It might be argued that these things reveal a preoccupation with the trivial or the superficial and this may be true for many of the children. The degree to which they show a deeper understanding in their writing is by no means uniform. Although there were plenty of examples of good descriptive writing, evidence of imaginative power occurred less frequently. Lack of talent in this respect is usually accompanied by limitations of other kinds such as lack of style, poverty of ideas and so forth. It is possible that skill in interpreting and in imaginative expression depends to some extent upon the opportunities for written work of this kind which the children have previously enjoyed. It seems likely that they also depend upon the initial impetus to imaginative or emotional experience which the educational situation itself provides. Where evidence of imaginative writing occurred it was spread fairly evenly throughout the groups. From this we can assume that the broadcast and the recording and the film were equally capable of evoking an imaginative response from those children who were sufficiently articulate to express it. For example the child from whose writing the following extract is taken has been more than superficially interested in what he has seen:—

“... but don't imagine that it is all fun for us on the sheep station. We are constantly worried by many pests and problems that we have to overcome. Firstly there are the rabbits. You may not believe it but the rabbit is the worst enemy of the lot. You may ask, how can a little rabbit harm an animal as large as a sheep? We thought that at one time but now we know better. They eat the sheep's food just like they eat the greens in your garden.

“It's now September and tomorrow we go to bring the sheep in and after that the real fun starts. What a time there'll be when the shearers arrive. They are real experts and fetch the fleece off all in one piece like the peel of an orange. It is then packed into bales and our mark put on them and the grade and then sent off to Sydney for auction. You should hear the bedlam in the auction room! Men leaping up and down and shouting to get their bids in first. And after all this is finished it is time to start all over again so there is never a dull moment.”

There are other examples which show that the children have been able to get the feel of this robust life and vicariously to experience it for themselves. Thus for the child who says

"I loathe the time when the shearers come. The noise and the dust and the chaos and strangers all over the place. . . ."

the illusion of being there is a very personal one. The solitude so rudely shattered by the arrival of the shearers is a very real thing for her. For her the imagination has been stirred and the emotions also. When visual experiences are able to do this they can be said to possess a degree of *intimacy* which brings the viewer close to the events of the screen, a quality which the broadcast, the recording, and the film all appear to share. Earlier it was suggested that this intimate relationship between viewer and screen might exist most strongly in television broadcasts on account of the personal attraction exercised by the presence of the commentator. Where this personality is an agreeable one and attractive to children they are likely to attend to him more readily and to be suggestible to what he has to say. So, in a sense he speaks more convincingly. There is no doubt of the personal magnetism of the popular television commentators. The same is true in this broadcast. The children spoke warmly of the commentator. They liked him and reacted favourably towards him. After certain other broadcasts not connected with this enquiry they have spoken adversely of the commentators and on those occasions their impatience was not concealed. There would seem to be little doubt that their attitude towards learning is in part conditioned by the personality of the commentator. But it is not the only factor (and is not necessarily the decisive factor) involved in making close personal contact with the screen. Children viewing "Eskimo Hunters" experienced a bond of sympathy with the two children in the film and, through them, with the Eskimo people. The continuous narrative of "The World's Wool" unfolded for them the seasonal events of the sheep farmer's year in which they felt closely concerned. The same intimate relationship was observed when children viewing the film "Sheep Ranch Country"<sup>3</sup> felt a similar attraction to the persons of the ranch, Mr. Robertson and his family, and through them to the life they led. It would seem therefore that this element of intimacy can be derived as much from the whole character of a broadcast or a film, as from the presence of a narrator. The uninterrupted sequences of film which reveal the way of life of a people are especially strong in this respect. This is particularly true when the film contains children of about the same age as the children in the class, which is probably one reason why films in "The Earth and its Peoples" series are invariably admired so much.

#### CONCLUSIONS

The live broadcast and the recording of it were equally instructive in that facts were learned from both of them.

The educational merit of the broadcast appears to owe nothing to *immediacy*, that is to say, to the fact that production and viewing take place at the same time. The programme has been shown to be equally

useful educationally after five months as when it was first produced. It is likely to continue to be so whatever the lapse of time.

The subject of this broadcast is not *topical*. But this has not reduced its effectiveness. Parts of it are exciting, clear, and stimulating and these are the things which the children have noticed and remembered. For instance, the depredations of the rabbits were shown in a most vivid shot which made a profound impression upon them. It is probable that this particular danger to sheep farmers is not now so urgent as it was at one time. It is indeed less than topical. But it was vividly presented and was certainly remembered. It is possible that in other geographical broadcasts there may be occasions when topical interest might outweigh other factors. The broadcast on the West Indies probably gained additional force because it coincided with the visit of Princess Margaret to inaugurate the Federation. How long such a broadcast would continue to be effective is not known. It would be interesting to repeat the procedure of this enquiry with a broadcast of known topical interest.

The broadcast, the recording of it, and the film all created geographical atmosphere and stimulated a response to it. The quality of *intimacy* was equally evident in each of these. It appears that this quality is principally dependent upon the nature of the screen situation as a whole.

These are the conclusions which refer directly to the purpose of this article as stated on pages 187-188. In passing we might also refer to various points of technique noticed while using the broadcast: for example the different use that might be made of the same broadcast with children of different intelligence; the ability of children to learn from diagrams shown upon the screen; their facility in remembering visual experiences by comparison with purely auditory experiences (i.e. words heard in the commentary but not seen on the screen); and in the case of the recording and the film the fact that the teacher is able to preview and plan ahead. Interesting information on these points emerged; they might be pursued more thoroughly with profit.

#### REFERENCES

<sup>1</sup> Report of an Enquiry into the special contribution which television might be expected to make to the work of the schools. School Broadcasting Council. London, 1954, paragraph 2.

<sup>2</sup> *Ibid.*, paragraph 6.

<sup>3</sup> Produced by Gaumont British Films. Another film dealing with the sheep country of southeast Australia.

# Geography Departments in Training Colleges

IN 1951 the Standing Sub-Committee in Geography of the University of London Institute of Education approved and published a report on the planning and equipping of Geography Departments in Training Colleges, drafted by Dr. G. B. G. Bull of Goldsmiths' College. At the request of the Training Colleges Section of the Geographical Association, this report, with minor revisions, became the basis of a memorandum which was approved by the Executive Committee of the Association as a guide to those responsible for the planning of new buildings, or of extensions to existing buildings, in the expansion of training college accommodation now taking place. On its publication in March 1959 the Memorandum was submitted to the Ministry of Education and copies were sent to all Directors of Education in England, Wales, Scotland and Northern Ireland.

Whilst the importance of our subject in education is now widely acknowledged and needs no emphasis, its practical needs in the matter of special laboratories, teaching facilities and equipment can be overlooked by architects and others unfamiliar with recent and current developments in the subject. It is hoped therefore that the Minister of Education and Directors of Education in Local Authorities will make the information in the Memorandum available to architects and administrative staffs and principals of colleges concerned with such affairs.

ALICE GARNETT

*Honorary Secretary*

## *Memorandum*

THE STUDY OF GEOGRAPHY in Training Colleges is essentially scientific in its methods. It lays great stress on the necessity for precision, exact measurement and first-hand observation. "Geographical knowledge that is not born of direct contact with mother earth or direct observation and investigation, and is not refreshed constantly by the springs of research in the field, is practically worthless." It follows that all colleges should have laboratories for Geography, just as they have laboratories for Biology. These should not be classrooms in the accepted sense, but specialized rooms containing specialized equipment set apart exclusively for the purpose of acquiring certain skills and techniques.

### SITUATION OF GEOGRAPHY DEPARTMENT

An extensive view from the windows is desirable, as a constant stimulus to observation of seasonal changes in the appearance of the landscape. Most conveniently the rooms can be situated on the ground floor, with ready access to the site of the College's weather station in the grounds. If on an upper floor, access to a flat roof is an advantage. If the aspect is southerly experimental observations of the sun and its shadows can be made from indoors. On the other hand, direct sunshine flooding a room is a disadvantage when filmstrips are being viewed with blinds partially drawn.

## NUMBER OF ROOMS

Even the smallest College which offers Geography as a main or advanced subject will need two adjacent rooms—a laboratory for practical work and a lecture room. A store-room and staff studies for tutorial work can, with advantage, be placed between the lecture room and the laboratory. All these rooms should be reserved exclusively for the use of Geography students, so that they can work without interruption at prolonged tasks.

A larger College, with 400 students or more, may reasonably expect to have two laboratories as well as a lecture room, store-rooms, etc. The growing tendency towards teaching by seminars rather than lectures calls for the provision of seminar rooms.

## SIZE OF ROOMS

The teaching of Geography demands plenty of space. In laboratories, each student working with a One-inch Ordnance Survey map and a notebook will need space of about 3 ft. by 3 ft. The addition of circulation space and room for the lecturer's demonstration bench will increase the requisite space to about 30 square feet per student. In lecture rooms 20 square feet per student may be sufficient if dual desks are installed. Lecture rooms must be long enough to allow an undistorted view of pictures projected on a screen, and lofty enough to prevent the shadows of light fittings or students' heads from obtruding on the screen.

## LIGHTING

Dark blinds are indispensable when the epidiascope or film projector is in use, but filmstrips and miniature slides are best viewed in subdued daylight. Spring blinds, stiffened with metal bars and moving in grooves at the sides of the windows, are the most satisfactory form of black-out. As sources of artificial light in lecture rooms, ceiling lamps which embody a metal grid to disperse light-beams and eliminate shadows are very suitable. For laboratories, individual table lamps whose position can be adjusted by hand to shed concentrated light at any point should be fitted to the benches. Before strip-lighting with gas-filled tubes is installed, tests should be made to make sure that the colours on maps are truthfully rendered.

## WALL SPACE

All walls should be faced with a material to which pictures and blocks of maps, however large, may be pinned. Wall-covering of a cork composition has the advantage that holes made by drawing pins close up after the pins have been withdrawn. As blocks of maps of very large dimensions play an important part in the teaching of Regional Geography, the wall-boards should form an unbroken stretch from ceiling to floor. Professional advice should be sought to ensure that the acoustic properties of wall and ceiling materials are satisfactory. The blackboard, with a slate or ground glass surface, and at least 4 feet from top to bottom, should cover most of the width of one end wall. The remaining part of that wall could be used to carry a projection screen, possibly angled across the corner of the room. If roller blackboards are installed, one section can be whitened to serve as a projection screen.

The most satisfactory position for a projection screen is one centred before the viewers; the layout of blackboard, screen and map-hanging apparatus must be considered carefully, in relation to this point.

#### VENTILATION

The necessity for adequate ventilation in a room which is frequently blacked out is often overlooked. Silent extraction fans in or near the ceiling will often be necessary.

#### FURNITURE AND EQUIPMENT

The following items of equipment are indispensable:

1. Flat-topped tables for the lecture room, at least  $4\frac{1}{2}$  by  $2\frac{1}{2}$  feet if two students are to be seated at each one. Tables of light construction with tubular steel legs, Formica tops and shallow drawers can readily be arranged in small blocks for group work. Stacking chairs have many advantages.
2. Benches for the laboratory, with ample cupboard space but allowing knee-hole spaces. A number of plate-glass sheets should be inset into the benches to act as the tops of tracing tables, illuminated from beneath by short, movable strip-lights.
3. Demonstration bench for lecturer, with shaded desk lamp and a sunken well for coloured chalks. The lower part of the desk may be fitted with shallow drawers for the storage of 10-miles to 1-inch maps, measuring 48 by 36 inches. The desk may well incorporate a large tracing table.
4. Map battens which can be raised and lowered by cords over pulleys fixed at ceiling level in appropriate positions.
5. A hanging globe, with washable slate surface bearing the outlines of continents boldly painted in white, placed in a good light above one end of the lecturer's bench, together with a standing or rolling globe with relief colouring.
6. Ample storage cupboards housed mainly in special store-rooms, with internal fittings to serve various purposes. For rolled-up wall-maps, the cupboard should be very tall and fitted with hooks; for folded wall-maps and wall-charts deep drawers are necessary, and filing racks for the storage of pictures. For filmstrips, geological and other specimens, pigeon-hole fittings are required.
7. Plan chests with shallow drawers; some of large size to hold One-inch and 10-mile maps, and others of smaller sizes to hold  $2\frac{1}{2}$ -inch, 6-inch, 25-inch and 50-inch Ordnance Survey maps, and foreign maps.
8. Laboratory sink with hot and cold water and removable wooden cover. A long shallow trough, with water inlet and outlet at opposite ends, is very useful for the experimental study of river development and wave-action.
9. Shelves for essential reference books. The main collection of geography books is best housed in the College library, but current periodicals, Government publications, etc. may be displayed in a suitable rack in the Geography department. Atlases require specially large shelves.
10. Projection equipment, including an epidiascope, a filmstrip projector with an additional carrier for miniature slides, and a 16-mm. sound and silent film projector, mounted on tubular steel stands fitted with castors; if possible cupboards should be provided in which this equipment can be

housed when not in use. Fabric dust covers should be provided for all projection equipment.

11. A duplicator, preferably a model which prints in several colours at one time.

12. An edge-binder (e.g., Admel) for binding maps, etc.

13. A photographic copying device. There should also be access to a photographic dark-room equipped with developing tanks and an enlarger, where slides, filmstrips and prints from negatives can be made.

14. Microscopes are necessary in certain courses where geology is studied.

#### CONSUMABLE EQUIPMENT

The equipment listed above can be regarded as furniture which seldom needs replacement. Geography departments require a considerable stock of less permanent equipment and from this point of view must be ranked with the sciences rather than with the humanities. It is essential that Geography lecturers should be allotted a termly grant for departmental purposes not inferior to that allocated to other sciences.

Budgetary provision should be made for an adequate initial stock of maps, both in teaching sets and in single copies, published by the Ordnance Survey, Geological Survey and foreign governments. There should be a good stock of aerial and other photographs, specimens, pictures, wall-maps and wall-charts; and of stationery, including cartridge, tracing and graph paper, duplicating supplies, cardboard, inks and colours.

#### LABORATORY ASSISTANCE

Departments of Geography in training colleges which already have laboratory assistance find that service invaluable. With the deepening and extension of geographical studies which must accompany the three-year course many more Geography departments will certainly need the services of a laboratory steward. In some cases the work of this member of staff may be shared with another science department. In the Geography department, the laboratory steward's work may include the classification and repair of maps, setting up and maintenance of projectors, preparation of lantern slides, operation of duplicator, maintenance of card catalogues of material available for academic studies and school practice, and various carpentering jobs. The overall college plans should include working accommodation for these members of staff.

Professor R. OGILVIE BUCHANAN, M.A., Ph.D.  
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H. L. WIDDUP, M.A.  
*Chairman, Training Colleges Section,  
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March 1959

# This Changing World

EDITED BY G. J. BUTLAND

## THE STATISTICAL PATTERN OF LAND USE IN GREAT BRITAIN

Because of serious discrepancies in our national land-use statistics it has, until recently, been difficult to decide how much land is actually taken up by agriculture, woodland and urban development. In particular, a marked disparity in available statistics occurs in the acreages recorded for the extent of the urban area in the 1930s. The figure for England and Wales estimated by the Ministry of Agriculture and Fisheries and quoted in the Scott Report (Report of the Committee on Land Utilisation in Rural Areas, 1942) was 4,162,000 acres, whereas the corresponding figure recorded by the Land Utilisation Survey was only 2,748,000 acres. A discrepancy of this order of magnitude cannot be accounted for by relatively minor differences in definition and in years of survey. The fault apparently lies in the statistics themselves and in the methods of computation used.

A decision as to which of the two figures is the more correct can now be made, however. This is because the Development Plans submitted to the Ministry of Housing and Local Government under the Town and Country Planning Act of 1947 provide a basis for a new calculation of the extent of the urban area in 1950. The figure of 3,602,000 acres for England and Wales derived from this investigation clearly corroborates the urban acreage

Table I  
LAND USE IN GREAT BRITAIN IN 1950

Land use	England and Wales		Scotland		Great Britain	
	'000 acres	per cent	'000 acres	per cent	'000 acres	per cent
Agriculture	29,916	81	15,323	80	45,239	81
Arable	13,949	38	3210	17	17,159	31
Permanent grass	10,496	28	1189	6	11,685	21
Rough grazings	5471	15	10,924	57	16,395	29
Woodland	2373	6	1334	7	3707	7
Urban development	3602	10	469	2	4071	7
Ungrazed deer forest	—	—	1819	10	1819	3
Unaccounted for	1242	3	124	1	1366	2
Total land area	37,133	100	19,069	100	56,202	100

of the Land Utilisation Survey rather than that of the Ministry of Agriculture and Fisheries when allowance is made for the growth of the urban area in the intervening years. Because the exaggerated urban acreage of the Ministry of Agriculture and Fisheries was obtained by residual estimation instead of direct measurement as employed by the Land Utilisation Survey, it can also be concluded that the figures for agricultural land as given in the Agricultural Statistics are *underestimated*, and this is borne out by other

evidence. The error probably lies almost wholly within the acreages recorded for permanent grass and rough grazings, and not in the arable area.

From this new analysis, a table of land use for Great Britain in 1950 (Table I) can now be constructed. The area of agricultural land (and its constituent uses) is recorded unchanged from the Agricultural Statistics for 1950, while the acreage of woodland is that recorded by the 1947-9 Forestry Commission census with net additions to 1950. The urban acreage is based on the estimates already referred to which have been made from Development Plan statistics and related data. The "unaccounted for" residue is composed of farmland escaping enumeration in the official statistics, farm and woodland plots of under one acre in extent, totally unutilized rural land, most opencast mineral workings, and parts of certain other "special" land uses which are not included under the three major categories.

Table II  
CHANGES IN LAND USE IN GREAT BRITAIN, 1900-1950

Year	Agriculture	Woodland	Urban development	Unaccounted for*	Total land area
	'000 acres	'000 acres	'000 acres	'000 acres	'000 acres
<i>England and Wales</i>					
1900	31,050	1900	2000	2180	37,130
1925	30,780	1880	2300	2170	37,130
1935	30,380	2120	2800	1830	37,130
1939	30,180	2290	3200	1460	37,130
1950	29,920	2370	3600	1240	37,130
<i>Scotland</i>					
1900	14,290	870	170	3740	19,070
1925	14,350	1070	—	—	19,070
1935	14,980	1090	360	2640	19,070
1939	15,020	1120	—	—	19,070
1950	15,320	1330	470	1950	19,070
<i>Great Britain</i>					
1900	45,340	2770	2170	5920	56,200
1925	45,130	2950	—	—	56,200
1935	45,360	3210	3160	4470	56,200
1939	45,200	3410	—	—	56,200
1950	45,240	3700	4070	3190	56,200

\* Including ungrazed deer forest.

A further study of the Agricultural Statistics reveals that their increasing completeness and accuracy since the end of the nineteenth century, and particularly the listing of land previously escaping enumeration, preclude any easy comparison of the total agricultural acreages recorded in different years. It now appears that the net loss of farmland in England and Wales to all other uses between 1900 and 1950 was about 7 per cent, or almost double the 1,130,000 acre decrease which a comparison of the total agricultural areas for these two years, as recorded in the Agricultural Statistics, would seem to suggest. Since 1900 the growth of the urban area alone has accounted for some 1,600,000 acres (an 80 per cent increase), the balance being composed of extensions in the acreage of woodland and the special land uses. The changes in acreage of the major land uses in the first half of the present century are set out in Table II. The figures for agricultural land are again repeated without adjustment from the Agricultural Statistics,

any farmland escaping enumeration being included in the "Unaccounted for" column.

The rate of loss of agricultural land to urban development in England and Wales increased markedly in the 1920s and attained its greatest proportions in the 1930s when the net diminution was over 60,000 acres per year. Since 1950 the net loss has, in contrast, been little over 37,000 acres per year. The additional area of land required for urban development and special uses in England and Wales between 1951 and 1971 is likely to be, at a minimum, 500,000 acres and, at a maximum, about 700,000 acres. Around the main cities and towns over 90 per cent of the land needed for development purposes during this period will come from agriculture. By the year 2000 it seems probable that more than 15 per cent, and perhaps as much as 20 per cent, of the total agricultural area in 1900 will have passed to another major use.

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### CHANGES IN THE URBAN POPULATION OF POLAND

The latest Statistical Yearbook for Poland, *Rocznik Statystyczny* 1958, Warsaw, provides useful data concerning the growth of the urban population, including figures of the number of inhabitants in the various towns on 31st December, 1957. The following notes have been compiled from this source and from information obtained during a recent visit to Poland.

The total urban population in 1957 numbered 12,977,000, compared with a total national population of 28,537,000, giving a percentage living in towns of 45.5. The corresponding figures for 1950 were urban population 9,243,000, national population 25,035,000, and urban percentage 36.9. In seven years, therefore, the urban population has grown by 3,734,000, or 40 per cent, and the urban percentage itself has increased by nearly one-quarter. This reflects the rapid pace of industrialization, associated with a large downward movement and the creation of new urban communities, and also the high rate of natural increase of the population, which stood at 18.0 per thousand in 1957 for Poland as a whole (birth-rate 27.5 and death-rate 9.5). This is about three times the British rate of natural increase and means a yearly increase of about half a million. Although the rate of natural increase for the twenty largest cities (14.8) is lower than for the nation as a whole, the rate is nevertheless remarkably high. In certain cities, especially those repopulated by new and youthful Polish inhabitants after annexation from Germany in 1945, the rates exceed the national average. Of these Szczecin has the highest rate (24.5), derived from a birth-rate of 31.2 and a death-rate of 6.7.

More than half of the urban population (53.5 per cent) lives in the 39 large towns with over 50,000 inhabitants, while 28.7 per cent lives in 183 towns with populations of between 10,000 and 50,000, and the remaining 17.8 per cent in 509 smaller towns.

If the six large towns of the Upper Silesian coalfield are considered as one urban concentration, and if Gdańsk (Danzig) and Gdynia are also treated as one unit, then it appears that Poland has nine large cities or urban complexes with populations in excess of 200,000, viz., in descending order of

population size: Upper Silesia, Warszawa, Łódź, Kraków, Gdańsk-Gdynia, Wrocław, Poznań, Szczecin, and Bydgoszcz. Other towns with over 100,000 inhabitants are Białystok, Częstochowa, Lublin, Radom and Wałbrzych.

The accompanying table shows the population of the leading Polish cities in 1957 and in certain earlier years. In some instances boundaries have, of course, been changed over the years. The table covers three broad periods: the pre-war period (1931-9), the second World War (1939-46), and the post-war years of recovery and expansion (1946-57). In the 1930s, when economic conditions in Poland were not particularly favourable, urban populations showed considerable growth, but at a slower rate than in the period 1950-7 covering almost the same number of years. Especially notable in the pre-war period was the rise of the new port and city of Gdynia, built in the narrow Polish Corridor as a rival to the German-speaking Free City of Danzig. By contrast the cities annexed from Germany in 1945 appear to have been stationary or even declining during this period, according to the Polish statistics.

	<i>Population (Thousands)</i>				
	*1931	1939	1946	1950	1957
Białystok	91	107	57	69	110
Bydgoszcz	117	141	135	163	216
Częstochowa	117	138	101	112	158
Gdańsk	(256)	(250)	118	195	266
Gdynia	30	120	78	103	137
Kraków	219	259	299	344	469
Łódź	605	672	497	620	687
Lublin	112	122	99	117	147
Poznań	245	272	268	321	383
Radom	78	†	69	80	120
Szczecin	(271)	(268)	73	179	244
Upper Silesia:—					
Bytom (Beuthen)	(101)	(101)	93	174	179
Chorzów	81	110	111	129	144
Gliwice	(111)	(114)	96	120	129
Katowice	126	134	128	175	206
Sosnowiec	109	130	78	96	125
Zabrze (Hindenburg)	(130)	(126)	104	172	185
Wałbrzych	(66)	(64)	73	94	111
Warszawa	1172	1289	479	804	1069
Wrocław	(625)	(621)	171	309	396

\* 1933 for former German cities, 1929 for Danzig (shown in brackets).

† No figure given.

Wartime devastation, the annihilation of the large Jewish urban population, and the removal by the Germans of many Polish townsfolk from those areas incorporated in Germany during the War, variously account for the serious fall in the population of many cities between 1939 and 1946, especially Białystok, Częstochowa, Gdynia, Łódź, Lublin, Sosnowiec, and Warszawa. Białystok and Warszawa suffered particularly heavily from the point of view of both physical destruction and population loss, involving many

Jewish inhabitants. On the other hand at Kraków, the capital of the part of Poland not directly annexed to Germany, war damage was negligible and the population increased substantially.

The former German cities of Breslau (Wrocław) and Stettin (Szczecin), lying in the so-called Oder-Neisse lands, annexed by Poland in 1945, suffered much damage during the latter part of the War, and the German population either fled before the advancing Red Army or was subsequently ejected by the Polish authorities. The same fate also befell Danzig (Gdańsk). In the industrial and coal-mining towns of Upper Silesia and Lower Silesia (Waldenburg/Wałbrzych), however, such destruction did not take place, and many of the inhabitants, especially those of Polish origin, have remained.

Since the War much progress has been made as regards the rebuilding of the damaged cities and the expansion of others, and populations have risen accordingly, in some instances to such a marked extent that pre-war totals have been greatly exceeded, as at Bydgoszcz, Kraków, Poznań, Wałbrzych, and towns in Upper Silesia, although admittedly municipal boundaries have been extended. Łódź, on the other hand, despite an increase in area, has shown no marked population growth since 1939, largely because of its wartime losses and the low priority given to any expansion of its textile industry since the War. The expansion of Kraków is perhaps one of the most interesting examples of post-war changes, much of the growth of population being attributable to the rise of the new iron and steel town of Nowa Huta,\* which, although situated some five miles to the east of the city centre, is nevertheless included within the city boundaries. The inhabitants of Nowa Huta are predominantly incomers from the overpopulated, but fertile, countryside of southern Poland.

The new Polish populations of Gdańsk, Szczecin, and Wrocław have increased impressively since 1946, and at Gdańsk the population figure now exceeds the 1939 level, while that for Szczecin is approaching it. The new population of Wrocław (much of it recruited from the Polish city of Lwów, now lost to the Soviet Ukraine) is still only two-thirds that of 1939, but this is scarcely surprising in view of the tremendous damage suffered by the city, the scale of destruction being almost comparable to that of Warszawa (about 80 per cent). Vast areas in the south and west of the city still lie in ruins.

As regards Warszawa itself much rebuilding still remains to be done, and despite an extension of boundaries, the population is 200,000 below the 1939 level. The pressure on accommodation in the city is leading to the expansion of neighbouring towns and villages, especially those linked to the city by good train and bus services, such as Legionowo, Piaseczno, Otwock and Wołomin, and some of the industrial settlements which stretch in a line south-westwards through Pruszków. Intense overcrowding typifies living conditions not only in Warszawa but in Polish cities generally, despite the growth of commuting on the basis of extraordinarily cheap season tickets and attempts by the authorities to prevent non-essential newcomers taking up residence.

The elimination of pre-existing international boundaries—whatever the justification for this—has had the interesting effect of making possible

\* For an account of Nowa Huta see N. J. G. Pounds, "Nowa Huta: a new Polish iron and steel plant", *Geography*, vol. xliii, 1958, pp. 54-6.

the integrated development of the entire Upper Silesian industrial complex and also of the twin ports and cities of Gdańsk and Gdynia. The six large towns of the Upper Silesian coalfield, together with intervening and outlying settlements, now constitute a special planning region known as "GOP" (Górno-Śląski Okręg Przemysłowy), i.e. "Upper-Silesian Region Industrial". The area is split into Zones A and B. The former embraces the core of the complex, with its coal-mines, metallurgical plants and typical "Black Country" landscape, and extends for about thirty miles from west of Gliwice to east of Sosnowiec. Zone B corresponds to the semi-rural and well-wooded areas to the north and the south into which "overspill" is being directed from Zone A. Official sources give a 1950 population figure of 1.7 millions for the entire area of GOP, of which Zone A contained 1.4 and Zone B 0.3. The figure for 1958 was 1.85, 1.5 being in Zone A and 0.35 in Zone B.

The cities of Gdańsk and Gdynia, together with the resort town of Sopot (1957 population 44,000), occupy a coastal strip some fifteen miles long extending north-westwards from the delta of the Vistula. The three municipalities are collectively known as the "Trójmiasto" (i.e. "Tri-town"). Settlement is almost continuous, although often tenuous in character, but the axis is further strengthened by the main road and railway linking the two cities, the latter having a frequent service of electric trains. Planning proposals involve further urban development along this route and also the building of satellite towns in the wooded morainic hill country overlooking the coastal strip. The population of the Trójmiasto increased from 334,800 to 447,200 between 1950 and 1957.

Some striking changes in the medium-sized towns are also worthy of note. Particularly marked population growth has occurred since 1950 in two categories of town—the towns of southern Poland, where industrialization is being undertaken to relieve rural over-population, and the former German towns of the Regained Territories in northern and western Poland. In the first category are Rzeszów (28,000 to 58,000), Tarnów (37,000 to 62,000), and three towns to the northeast of Kielce—Ostrowiec (20,000 to 35,000), Skarżysko-Kamienna (17,000 to 34,000) and Starachowice (24,000 to 35,000). In the Regained Territories the following towns have shown a high rate of population growth (former German names in brackets):—

	1950	1957
	<i>Thousands</i>	
Olsztyn (Allenstein)	44	62
Elbląg (Elbing)	48	72
Słupsk (Stolp)	33	51
Koszalin (Köslin)	19	39
Piła (Schneidemühl)	21	31
Gorzów Wielkopolski (Landsberg)	33	48
Zielona Góra (Grünberg)	32	45
Legnica (Liegnitz)	39	58
Jelenia Góra (Hirschberg)	35	47
Opole (Oppeln)	39	57

## MESTA CULTIVATION IN WEST BENGAL

Even as late as the 1940s *mesta* or *kenaf* was a relatively unimportant fibre crop of West Bengal. The fibre was then mainly utilized in the production of rope, cordage etc., for local consumption. In the post-partition years, raw jute supplies from East Pakistan to the Indian mills became relatively uncertain and the Calcutta mills began to use mesta to meet their deficits, creating a demand which has resulted in a spectacular increase in the mesta area in West Bengal, from 18,000 to 362,000 acres between 1952 and 1959.

Before 1948, Bombay, Hyderabad, Madhya Pradesh and Madras claimed a major percentage of the area and production of this crop and the concentration of mesta production in Deccan region earned for the fibre the name "Deccan hemp". During recent years, however, the position has completely changed. West Bengal has now outstripped all other States in mesta production, having in 1959 about 44 per cent of the total area and 50 per cent of the total output of India. The crop covers about 1.5 per cent of the net sown area of West Bengal.

Mesta fibre is obtained from the plant *Hibiscus cannabinus* Linn. (Family *Malvaceae*) introduced to India from its native habitat, Sudan, and cultivated in the same way as jute but thriving well in a wider range of ecological conditions. The plant is hardier than jute and can withstand drought conditions, though water-logging at the early period of growth is injurious to the plant. Unlike jute, it can be grown on rocky and laterite soil; but it favours a fertile alluvial loam.

In West Bengal, mesta is cultivated on slightly higher land. Its concentration in the eastern district is favoured by the availability of retting water from the numerous tanks and marshes in the growing areas, and the proximity to the milling areas which offer the best market.

Unlike jute mesta is generally not liable to the attacks of diseases and pests. It requires less care in its cultivation. It takes a longer time to mature and may be harvested for retting when the plants are in full flower (like jute) or, unlike jute, in a late stage when the plants are fully matured. In the latter case, however, the fibres become rather coarse. The crop takes a longer time of retting, 8–12 days more than required by jute.

The average yield of the fibre in West Bengal is about 1200 lb. per acre, as compared with jute 1068 lb. per acre.

Mesta normally has a slightly lower cellulose and higher lignin content than jute. It is coarser and generally cannot be spun to fine counts. Hence in the jute mills, it is used in admixture with jute in the manufacture of hessian which demands fine, good quality yarn preparation. The fibre is employed for tying rafters, roof-building, and making sacking and coarse canvas. Ropes made out of the plaited fibre are used for drawing water, making fishing nets and for caulking canoes. Being more durable than jute, the fibre is also used in paper making, especially in the manufacturing of wrapping paper.

From limited cultivation on the red and lateritic infertile soils of western districts of West Bengal, the crop has now spread on to the true jute-growing area in the east of the State. The main causes of such a remarkable expansion of acreage (see Table I) in West Bengal are: (i) steady market demand of this fibre by Calcutta jute mills following Partition, (ii) higher

yield per acre than jute, (iii) relative ease of cultivation and less risk of crop failure due to its adaptability to wider climatic and edaphic ranges. The anomalous drop in acreage and production in 1957-8 was due to adverse weather conditions—prolonged drought during the sowing season and excessive rain and flooding during the growing season.

Table I  
AREA AND PRODUCTION OF MESTA IN WEST BENGAL

<i>Years</i>	<i>Area in Acres</i>	<i>Production (in bales of 400 lb. each)</i>
1952-53	18,000	50,000
1953-54	12,000	36,000
1954-55	131,000	428,000
1955-56	193,000	612,000
1956-57	297,000	804,000
1957-58	267,000	590,000
1958-59	362,000	(data not available)

Mesta, because of its coarseness, fetches a low price, by about Rs. 4-5/- less per maund than jute (1 rupee =  $1\frac{1}{2}$  shillings; 1 maund = 82.2 lb.). The cost of cultivation is the same as for jute, though there is every chance of increase in jute production costs due to the incidence of diseases and pests and inclement weather. The farmers, therefore, are inclined to use some of their jute lands for mesta production.

Table II  
PROFIT PER ACRE FROM THE CULTIVATION OF JUTE AND  
MESTA IN WEST BENGAL

<i>Crop</i>	<i>Cost of production</i>	<i>Yield and income</i>	<i>Profit</i>
Jute	Rs. 180/-	13 maunds. Sold at Rs. 25/- per maund = Rs. 325/-	Rs. 145/-
Mesta	Rs. 180/-	15 maunds. Sold at Rs. 20/- per maund = Rs. 300/-	Rs. 120/-

Practically speaking, mesta production on jute land is uneconomic. The land cannot be utilized for the production of a second crop like winter paddy, pulses, or winter vegetables, as in the case of a jute crop. When there is a deficiency of foodgrains, such possibilities of increasing cereals or pulses through double-cropping cannot be ignored. The present situation can, however, be improved by (i) assuring higher price of good-quality jute in the jute areas of West Bengal, (ii) assuring a good price of mesta in the non-jute-growing areas, and (iii) providing better facilities for the raising of food crops as a second crop on cash-crop land by the introduction of early-maturing varieties of seeds, increase in irrigation facilities and a more rational distribution of manures and fertilizers to the cultivators.

It is most important that in West Bengal to-day the best jute land should be used to raise the best quality fibre for the industry; and marginal areas should be used for mesta production to supplement the requirement of coarser fibre. A change to these conditions would be to the country's economic advantage, both in the production of these fibre crops and in their processing industries.

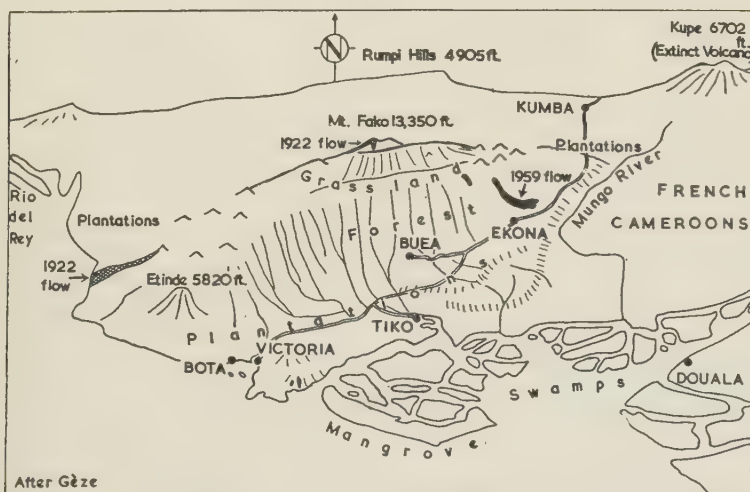
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### THE ERUPTION OF MOUNT CAMEROON FEBRUARY—MARCH 1959

Mount Cameroon, a complex volcano rising to 13,350 feet above sea level and measuring approximately 30 miles by 20 miles at its base, is formed along a northeast-southwest axis, parallel to the Cameroons volcanic line from the Bambouto Mountains, French Cameroons, to Annobon, and consists of basaltic lavas interbedded with tuffs and volcanic agglomerates. The lower slopes of the mountain have become an important producing region of bananas, oil-palm products, rubber, and some tea and coffee, from both plantations and small farms.

In this century, after lying dormant for 40 years, the volcano erupted in 1909, the lava flowing from a crater on the northern slopes causing the hurried evacuation of the German colonial government from Buea to Douala. In 1922 the volcano erupted both at the summit with a short lava flow and from craters in the west, whence lava flowed to reach the sea destroying plantations in its path. In 1954 explosions at the summit considerably altered the shape of the 1922 crater, but there was no emission of lava.



The latest eruption, beginning on the 6th February, 1959 and lasting until mid-March, occurred on the eastern slopes of the volcano above Ekona. There were four craters, three with emissions of lava. The main flow, which came from two vents around 5000 feet above sea level in the forest zone, reached the farming area and destroyed several small cocoyam and banana

farms. Nearly a mile wide and 50 feet high, it stopped some 300 yards short of an oil-palm plantation and within one mile of the only road from the coast into the interior of the Southern Cameroons.

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### THE CO-OPERATIVE MOVEMENT IN THE SOUTHERN CAMEROONS

The most significant recent economic development in the British Southern Cameroons has been the rapid growth of co-operative societies to a key position in the economy of this small territory. As recently as 1953, when the territory became autonomous, the movement was a small one, consisting of 38 societies with 2228 members. In 1958 there were 141 societies with 10,011 members, and estimates for March 1959 indicate 158 societies with 13,000 members, and 20 more societies in formation. The movement, unlike that in neighbouring French Cameroons and those in British East Africa, is entirely voluntary.

As with the plantations in the territory, bananas at present provide the most lucrative export. The societies' production of this fruit in 1953 totalled 9480 stems; in 1959 they are handling all the non-plantation production, estimated at one and a half million stems. Moreover, owing to severe losses of plantation bananas through a blow-down in March 1959 which destroyed 2.2 million plants, it is likely that production from co-operatives will for the first time exceed that from plantations. The main producing areas are around Mount Cameroon, in Victoria and Kumba Divisions.

Bananas are not, however, regarded as a sure foundation for future progress, because of the spread of Panama and Sigatoka diseases. The movement now handles, therefore, about 1700 tons of cocoa in the season, or one-third of the Southern Cameroons crop, mostly from Kumba Division, and has introduced grading of the beans in order to combat the smokiness which has given the territory's cocoa a bad name and brought down the price in recent years. Collection of palm kernels also began in 1957 in Mamfe Division and it is hoped to market palm oil in the future from Widikum, until now a poor area.

The most rapid field of development at the present time is in the production of coffee, Arabica from the Bamenda Highlands and Robusta from the lower areas in Mamfe, Kumba and Victoria Divisions. The movement now handles over 50 per cent of the crop, amounting in 1958-9 to approximately 700 tons of the Arabica variety and 500 tons of Robusta coffee. With the steady improvement of roads in the interior districts, this development, particularly of Arabica coffee from Bamenda, is likely to continue.

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### THE AUSTRALIAN MOTOR VEHICLE INDUSTRY

In the post-war years, the Australian motor vehicle industry has come of age. The body-building section dates from 1917, when the Commonwealth Government sought to conserve shipping space by requiring that two-thirds of all cars were to be imported without bodies; three years later, the infant

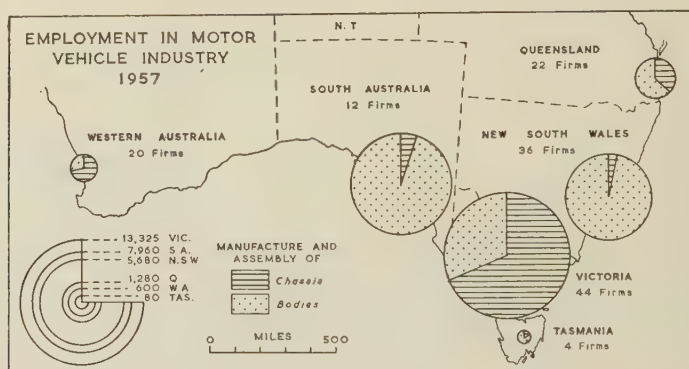
industry was given tariff protection. Then in 1925 the first substantial plant for chassis assembly was established by the Ford Motor Co. of Canada at Geelong, Victoria, and the following year saw production start at the assembly plant of the General Motors Corp., Fishermen's Bend, Melbourne. But it was not until after the second World War that vehicles comprising mainly Australian-made parts began to be produced.

Since then, the Australian industry, which consists predominantly of the largest vehicle manufacturers in North America and the United Kingdom, has expanded rapidly with government encouragement. As a result the number of vehicles imported fully built-up has slumped from 103,000 in 1950 to less than 5000 in 1958 when almost as many Australian-made vehicles were exported, chiefly to New Zealand, and production totalled 240,000 vehicles (see *The Australian Motor Vehicle Industry*, Dept. of Trade, Melbourne, 1959). Although vehicle manufacture and assembly gave employment to only 29,000 persons in 1957, another 20,000 were employed in the manufacture of parts, some 50,000 in the repair industry, and many thousands more in ancillary activities. Thus, in all its many ramifications, the motor industry accounted for one-eighth of Australian factory employment as defined by the Commonwealth Statistician.

Eight firms together assemble or manufacture locally about 95 per cent of the vehicles marketed in Australia. General Motors-Holden's Ltd., which began marketing Australia's first mass-produced car in 1948, occupies pride of place, producing 119,000 vehicles in 1958, or one-half the Commonwealth output. The company not only manufactures the Holden but also assembles in Australia Chevrolet, Pontiac, Vauxhall and Bedford vehicles totalling about 15,000 a year. Next comes the Ford Motor Co. of Australia Ltd., which uses Ford V8 engine components imported from Canada, components for English-type models imported from Dagenham, and a growing proportion of local components. Output in 1958 was 34,000 vehicles, or 14.3 per cent. The British Motor Corp. (Australia) Ltd., which now undertakes complete manufacture and markets Austin, Morris, Wolseley and M.G. vehicles, ranked third with an output of 30,000, or 12.6 per cent. Volkswagen (Australasia) Ltd. accounted for 16,700 vehicles (7.0 per cent), Rootes (Australia) Ltd. for 8500 Hillman, Humber and Singer vehicles (3.5 per cent), Standard Motor Co. (Aust.) Ltd. for 7400 Standard and Triumph vehicles (3.1 per cent), Chrysler Australia Ltd. for 4500 (1.9 per cent), and International Harvester Co. of Australia Ltd. for 4300 (1.8 per cent). It is impossible to distinguish the proportion of vehicles merely assembled and not manufactured in Australia, since most assemblers of imported vehicles include some local components.

Nearly one-half of all employees in the industry are concentrated in Victoria, which specializes in chassis manufacture, notably at Fishermen's Bend (GMH). Chassis and body assembly plants are located at Dandenong (GMH), Fishermen's Bend (Rootes and Standard), Clayton (Volkswagen), and West Footscray (Leyland Motors Ltd.), all within the Melbourne metropolitan region, while the Ford plants at Geelong and the International Harvester plants at Geelong and Dandenong undertake the manufacture and assembly of both chassis and bodies. Fords also operate a small plant at Ballarat (Australia's largest inland city) and are currently completing a new large assembly plant at Broadmeadows, Melbourne. In recent years,

industry and population in Victoria have been growing at a relatively faster rate than have those of New South Wales, and an important contributing factor has undoubtedly been the rapid expansion at Melbourne and Geelong of the vehicle industry.



All other states, except Western Australia, specialize in the body-building section of the industry, though mass production is confined to Adelaide and Sydney. Adelaide has in fact two (GMH and Chrysler) of the three principal body-building plants in Australia, both being outgrowths from local coach-building businesses. The largest body-manufacturing plant in the Commonwealth is the GMH plant at Woodville, which ships most of its output to Melbourne for vehicle assembly. Both GMH and Fords cater for the local market with assembly plants at Adelaide, as in each of the State capital cities except Hobart. Aside from the Woodville and Birkenhead plants in Adelaide, GMH are expanding to the satellite town of Elizabeth, 12 miles north of the city. The Chrysler company, which has eight plants in Adelaide, is undergoing rapid expansion at Tonsley Park. In Sydney, in addition to the GMH and Ford plants at Pagewood and Homebush respectively, BMC have large body-building and assembly works at Zetland. Elsewhere, apart from GMH and Ford assembly plants at Brisbane and Perth, the industry is confined to the small-scale manufacture of special bodies. In Tasmania this takes place mainly at Launceston, the island's transport and communications centre.

The Australian motor vehicle industry continues to expand rapidly. Assembly and manufacturing capacity is fast approaching 335,000 vehicles a year, and if all the existing plans for development are carried out, capacity will quickly rise to 375,000. It is however unlikely that within the next decade local demand will rise much above 330,000 a year, and this leaves a considerable balance for which export markets in the Pacific, southern Asia and Africa will have to be found. Since these areas are for the most part established markets for United Kingdom and West German manufacturers, competition promises to become particularly acute.

*University of Tasmania*

PETER SCOTT

# The Geographical Association

## EVA G. R. TAYLOR LECTURE FUND

To mark the occasion of the eightieth birthday of Professor Emeritus Eva G. R. Taylor, D.Sc., LL.D., on 22nd June 1959, an appeal has been launched for a fund of £1000 to endow an annual lecture to be given by a distinguished scholar, in the branches of knowledge to which she has made, and is still making, such notable contributions—the history of nautical science, of navigation, and of geographical ideas and discovery. Beginning her long geographical career in 1904 at the Oxford School of Geography, Professor Taylor was for nearly forty years a stimulating teacher, principally as Professor of Geography at Birkbeck College in the University of London. She is an honorary member of the Institute of Navigation and a vice-president of the Hakluyt Society; her academic distinctions include the award of the Victoria Medal of the Royal Geographical Society.

The appeal committee, on which the Geographical Association is represented by its president, Professor J. A. Steers, believes that there could be no more fitting recognition of Professor Taylor's singular service to learning than the endowment of a lecture to promote scholarship in her fields. Those wishing to subscribe are invited to send contributions, made payable to the Eva G. R. Taylor Lecture Account, to the Honorary Treasurer of the Fund, Mr. D. Chilton, The Science Museum, London S.W.7.

## CONFERMENT OF HONORARY DEGREE

On the occasion of the 50th Anniversary of the Stockholm School of Economics, His Majesty the King of Sweden approved the conferment of the Honorary Degree of Doctor of Economics on Professor L. Dudley Stamp (who is Honorary Treasurer of the Geographical Association) for "fundamental research in regional geography to the benefit of economic life and community planning". This is the first time that such an Honorary Doctorate has been conferred on a geographer. The ceremony took place on 29th May 1959 in Stockholm City Hall.

## HERBERTSON MEMORIAL LECTURE

The twelfth Herbertson Memorial Lecture will be delivered by Professor E. W. Gilbert on Friday, 1st January 1960 at 11.30 a.m., during the course of the Annual Conference at the London School of Economics. Professor Gilbert's topic will be "The Idea of the Region".

## ANNUAL CONFERENCE 1959-60

The dates of the next Annual Conference, which will be held at the London School of Economics, are from 30th December 1959 to 2nd January 1960. The programme will be sent to all members, without application, in November; it will give full details of lectures, section meetings and business meetings. Facilities for the accommodation of members will be available at Campbell Hall and information about making reservations will be given in the programme.

## ANNUAL SUBSCRIPTIONS

The renewal date for subscriptions for the period 1st September 1959 to 31st August 1960 was 1st September 1959. The annual subscription for full members for the period is £1 1s.; for schools and colleges subscribing at the special rate for extra library facilities, £2 2s. Members who have not already renewed subscriptions are asked to do so as early as possible. The November issue of *Geography* is sent only on paid-up subscriptions.

## INCOME TAX RELIEF ON ANNUAL SUBSCRIPTIONS

Members paying annual subscriptions are reminded of the announcement made on pages 280 and 282 of the November 1958 issue of *Geography*, to the effect that the Geographical Association has been approved by the Commissioners of Inland Revenue for the purposes of Section 16, Finance Act 1958, under which many members will

qualify for tax relief on annual subscriptions, provided appropriate claims are made. Annual subscriptions at present paid under Deed of Covenant cannot be included for tax relief until after the expiry of the Deed.

#### BRANCH NEWS

It is encouraging to report the establishment of branch activities in Southampton, and members in that locality are urged to support the efforts of the local committee. Inquiries about branch activities there should be addressed to Mr. D. G. S. Petty, 43 Charmwen Crescent, West End, Southampton.

It has been suggested that branch activities should be revived, if possible, in Sunderland where there was formerly a flourishing branch. Local members willing to support a branch in that area are asked to write to Mr. I. G. McIntosh at Bede Grammar School for Boys, Durham Road, Sunderland.

#### HUMBOLDT CENTENARY CELEBRATIONS

The centenary of the death of Alexander von Humboldt on 6th May 1959 has been commemorated in many countries, especially in Germany and in Latin America. The centenary was commemorated in Berlin by ceremonies attended by geographers from many countries, amongst whom were representatives of the Geographical Association. In West Berlin the celebrations on May 18th and 19th were followed by the biennial conference of West German geographers, the *Deutscher Geographentag*, the programme of which was devoted in part to Humboldt and in part to Carl Ritter, the centenary of whose death falls in this same year.

Celebrations in East Berlin took the form of a series of meetings from May 5th to 20th, including a meeting in Potsdam of the *Geographische Gesellschaft in der Deutschen Demokratischen Republik*. A feature of both German geographical conferences was that they resembled those of our own Association in catering for both university and school geographers, who attended all main sessions together, dividing into special sections only for short specialist meetings.

#### ARCHAEOLOGY OF THE INDUSTRIAL REVOLUTION

The Council for British Archaeology has recently formed a research committee for the archaeology of the Industrial Revolution, and a first conference on industrial archaeology of the seventeenth to nineteenth centuries will be held on Saturday, 12th December 1959, at the London School of Hygiene and Tropical Medicine, Keppel Street (Gower Street), London W.C.1. Members interested and wishing to attend should apply for further information to the Assistant Secretary, Council for British Archaeology, 10 Bolton Gardens, London S.W.5.

#### ORDNANCE SURVEY MAP EXTRACTS

The Geographical Association no longer has stocks of sets of extracts of O.S. One-inch maps. Surplus examination extracts are normally available direct from the Ordnance Survey and information about sheets and prices can be obtained from the Director, Ordnance Survey, Leatherhead Road, Chessington, Surrey.

#### AIR PHOTOGRAPHS

The Air Ministry has resumed production of aerial photograph prints for civil purposes, though the volume of work in hand and pressure of service work may cause delay in the fulfilment of orders. Requests for prints, addressed to the Under Secretary of State, Air Ministry S.4e, Whitehall Gardens, London S.W.1, should be accompanied by location details and a tracing from a 1-inch O.S. map of the area required, and a statement of preference with regard to scale, date and season of photography and whether prints are wanted for minimum overlap or for stereoscopic use. Enlargements from the whole or any part of a negative can be supplied at special prices. Ordinary contact prints, about 9×7 inches, cost 6s. each to the public (privilege rate for staff and students of educational establishments 3s. 6d.). The cost of postage and packing is added to the account sent on the supply of the photographs.

# Reviews of Books

With very rare exceptions books reviewed in this journal may be borrowed from the Library by full members and student library members of the Association.

**Geography of World Affairs.** J. P. Cole. 11 × 18 cm. 348 pp. Harmondsworth: Penguin Books. 1959. 3s. 6d.

**The Background to Current Affairs.** D. Crowley. 14 × 22 cm. ix + 370 pp. London: Macmillan and Co. Ltd. 1959. 21s.

These books are directed, though from very different angles, to world events in the post-war period. Their authors are obviously well equipped, by temperament and through travel, to cultivate this wide field. Mr. Cole has written a straightforward account of the geographical background, with the accent on economic activity rather than on political, racial and social aspects. His is pre-eminently a simple (though not over-simplified) exposition for those who have "no special training in geography". Students and older pupils might find naive the statement that density of population is the average number of persons per unit of area: but there are many salutary reminders of such elemental points as the exaggerated nature of claims that the Soviet rate of industrial expansion is "unprecedented". The introductory chapter is concerned with the ambiguities of the world map and of egocentric viewpoints. The body of the book hinges on a division of the world into three major political zones, equivalent to the communist *bloc*, the intermediate shatter belt of political turmoil running from Scandinavia to Japan, and the New Lands. These are subdivided into geopolitical and cultural realms, each described with care and substantiated by a complete bibliographical list. The greatest lapse is undoubtedly the untidy appearance of many of the maps; but quantitatively sixty illustrations are good value for the cost of a Penguin Special.

Dr. Crowley has produced a book very different in character and appearance, unashamedly adopting a Britannocentric view of the immediate historical background of current events in Cole's "inner zone"—Western Europe, North Africa and Southern Asia, together with the Commonwealth and China. The few maps are clearly drawn but not very informative. Geography is either neglected ("by historical accident Britain . . . built up a world-wide chain of interests") or is belittled by misleading generalizations ("Japan possesses virtually no raw materials"). Here is no division into geopolitical regions: but the starting point is just as definite—the contrast between the waning of nationalism (plus the beginnings of internationalism) in Europe and North America on the one hand; on the other, the tempestuous rise of national consciousness in Afro-Asia. The thesis is taken further by the suggestion that this duality yields most of the world's problems. A great number of economic, racial and political situations are succinctly examined, with easily flowing and balanced accounts of, for example, Saar reunification, *apartheid*, and dialectical materialism. This is indeed a provocative book, partly because the author is not afraid to express his own opinions forcibly. The least convincing part is, however, the central thesis: nationalism in Europe is not dead yet, or even out-moded, as feeling in the Saar and in Hungary demonstrated. And surely it is not internationalism in Western Europe which is antithetical to national aspirations in Africa and Asia. But provocativeness is of the essence of international affairs; and the two books are beautifully complementary, standing as mutually indispensable companion volumes for those who need an all-round view of world events.

P. D. W.

**The Tropical World. Its Social and Economic Conditions and its Future Status.** Pierre Gourou. Trans. by E. D. Laborde. 2nd edition. 14.25 × 22 cm. xii + 159 pp. London: Longmans, Green and Co., Ltd. 1958. 20s.

The first edition of this great little book appeared in 1953 and was reviewed in *Geography*, vol. 37, 1953, p. 337. It has had an impressive influence on teaching and

thinking about the tropics, and that not only among geographers. This new edition is to be warmly welcomed because its appearance is an indication of the deserved success of its precursor and because it contains new thoughts on the tropics. True, most of the text and all of the figures remain unaltered, but the author has made a number of important additions and a few small deletions. The effect is, amongst other things, to give a rather more optimistic and less deterministic view of the tropics, for example in the statement that "it would be rash to affirm that the human geography of the sparsely populated regions of the Tropics had been due to the local factors of unhealthiness and the poverty of the soil" (p. 5) and that a high degree of civilization is not incompatible with tropical conditions (p. 24); and to be kinder to tropical peoples, e.g. in claiming that the backwardness to be seen in the tropics is not due to the quality of the people but to their farmers, their environment, and their history (p. 80).

It is a pity that mistakes in translation have persisted, e.g. in converting kilogrammes per hectare to bushels per acre (p. 15) and in translating *l'autarcie* as autarchy (self-government) instead of autarky (economic self-sufficiency).

B. H. F.

**The North American Deserts.** E. C. Jaeger. 16 × 23.5 cm. vii + 308 pp. Stanford, California: Stanford University Press. London: Oxford University Press. 1957. 45s.

Although expressly designed to inform those desert travellers and residents who are sufficiently curious about the rich natural history around them to take trouble to learn to recognize and interpret what can be seen, a work of such attractive title might properly be expected to offer good reading even for those whose visits must be vicarious. In fact it succeeds neither in its prime purpose as a traveller's guide nor as an account of the desert's fundamental characteristics. The author's assertion that no one can fully appreciate the desert around him if he does not have a close knowledge of the plants can be acclaimed but the 221 line drawings offered, arranged as a mixture of trees, shrubs, herbs and flowers according to the predominant flower colours will frustrate rather than help. A complete flora being beyond the scope of the book, how much more helpful would have been some colour photographs of the dominant individual and characteristic associations. There are also 134 line-drawings of insects, reptiles, birds, and mammals.

Despite the claim that the presentation of material is scientific there are legitimate doubts about the ability of the author, a zoologist, to handle the whole range of material with equal competence. An early example of misconception occurs on p. 2. "The chief causes of deserts are mountains . . . cutting off the moisture laden clouds" and again "in a few cases . . . a cold ocean current acts much as mountains do in robbing the rain clouds of moisture". The descriptive chapter on "Weather and Climate", contributed by Dr. P. Meigs, however, is sound. Desert landforms as an essential part of the natural endowment of the deserts are clearly a very subsidiary part of the author's sensitivity for their treatment is slight and superficial. Combining as it does something of a guide book, an outline of topography, a catalogue of plants, insects, reptiles, birds, and mammals, with sections that read like a travel agent's literature, it is sadly difficult to think of any category of reader or traveller who will be satisfied. It is disappointing that such a good and attractive theme has been so poorly served.

N. P.

**Landscape from the air: A physical geography in oblique air photographs.** F. J. Monkhouse. 18.5 × 25 cm. ix + 52 pp. Cambridge: University Press. 1959. 8s.

This book consists of 52 aerial photographs illustrating various types of land form, each accompanied by explanatory comments. There are ten sections, including

rock types and structures, vulcanicity and features related to drainage, glaciation, deserts, coast lines and lake basins. Each photograph is located carefully with grid references and a brief description of the view is followed by an analysis and a short selection of other examples. It is in the analyses that the author has provided the most valuable geological and geomorphological information—often in a few but almost invariably well-chosen words. The main purpose of this book is to train geography students in the use of aerial photographs and to prepare them for answers to certain types of advanced examination questions. As indicated in the preface use must be made of maps (both O.S. and geological) as well as a standard textbook of physical geography. In nearly every case the photographs are well chosen and excellently reproduced. The author has shown a little lack of discrimination and if some overlap of material had been avoided the contents might have been increased. Rough Tor, Bodmin Moor (No. 14) is the least satisfactory photograph—it is really difficult to make out; whilst a more oblique view of Malham Cove (No. 16) would be more valuable. An upland river valley in Norway and a barrier reef in the Cook Islands are also not quite the best of choices. At the price the book should be most successful with students and teachers of both geography and geology.

N. K. H.

**Géographie Economique et Sociale.** A. Cholley (Editor). **Tome V, Géographie de la Population.** 2 vols. J. Beaujeu-Garnier. 17 × 25 cm. 435 pp. and 574 pp. Paris: Librairie de Médecis. 1956 and 1958. 3000 frs. and 3600 frs.

France has always been a leader in demographic studies and in recent decades, when there has been a great boom in the subject, the work of men like Huber, Bunle, Landry, Sauvy, Chevalier, Fromont, Reinhard and Bourgeois-Pichat is justly renowned. Since the war French geographers have entered the field and have published several important books on the geography of population, a study sometimes skimmed in British University departments of geography. The omniscient Pierre George gave us a brilliant systematic study in his *Introduction à l'étude géographique de la population* (1951), which Maximilien Sorre, master of human geography, followed with *Les migrations des peuples* (1955).

Mme. Beaujeu-Garnier, Professor at Lille, has opted for the regional method, and after a cursory first part devoted to scope, statistics, density and distribution she plunges straight into the complexities of the composition, distribution, migrations and growth of population in western and southern Europe. Then come the offshoots of these countries, "les prolongements blancs de l'Europe" (U.S.A., Canada, Australia, and New Zealand) and racial-mixing Latin America. Volume II deals with the demographic effects of white domination over Africa, the sparsely peopled desert domain of the Middle East, the "teeming millions" of southern and southeastern Asia as well as the experiences of the communist bloc.

It is a mammoth task, but the result is rich in thought and fact and savoured with a modicum of clear, well-selected maps and diagrams, the work of the cartographers of the *Institut de Géographie* of Paris. The choice of approach in a book of this type is naturally influenced by the availability of studies and statistics, but Mme. Beaujeu-Garnier has tackled each region according to its peculiarities. Moreover, she has avoided being swamped in the ocean of references and has produced a balanced book with a readable style, an answer to those who might wonder why it was not written in collaboration with regional specialists. The work is obviously designed for university students to whom one must recommend it as the best regional study of world population in any language.

J. I. C.

**Géographie Économique et Sociale.** A. Cholley (Editor). **Tome VI, Géographie des Textiles.** A. Allix and A. Gibert. 17 × 25 cm. 564 pp. Paris: Librairie de Médecis. 1956. 3300 frs.

French students of geography are indeed fortunate to have at their service such a large number of dedicated and dynamic professors, who evidently regard textbook writing as one of their most important duties. Compared with the wretched trickle from British universities, a rich spate of excellent texts on all branches of geography at all levels has issued from French universities to preserve the high traditions of French geography. Well up to standard is this mature, comprehensive and balanced volume on the geography of textiles, by two famous professors, appropriately of Lyons. They divide their book into three parts: in the first which is entitled "the place of textiles in human activities" we find chapters on raw materials and the process, structure and location of the textile industry, the second and largest part on "the world supply of textile materials" includes an intriguing chapter on the production of artificial and synthetic fibres, and naturally the third is devoted to "the great textile regions of the world". The detailed treatment of extra-European textile manufactures is admirable. Readers will also be grateful for the ample bibliography, the index of technical terms and the attractively presented photographs which are drawn from a variety of sources and greatly enhance the book. It is a pity, therefore, that the maps do not attain the high standard of the text; a number would benefit from construction on a larger scale and subsequent photographic reduction. In particular one must object to Fig. 34, a tangle of English textile towns, which include Barnsley, Keishley and Aintrey (sic).

Nevertheless, one can only lament both the lack of an equivalent work in English and the paucity of translators, for one can hardly expect our own university students to cope with over 500 pages of specialized text, heavily laced with technical terms.

J. I. C.

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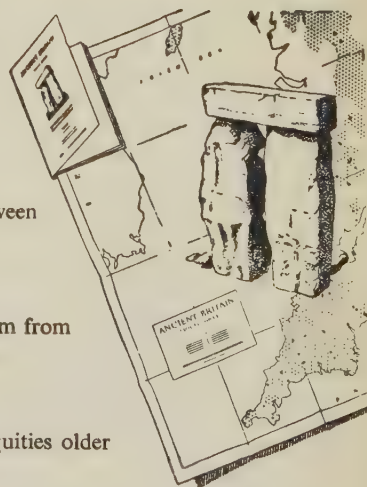
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# Geographical Articles

*Listed from Periodicals received in the Library*

CONTINUED FROM VOL. XLIV, PP. 142 TO 144

Journals listed here may be borrowed from the Library by members of the Association in the British Isles. References are listed according to the classification published in the *Annals of the Association of American Geographers*, vol. xxvii, June, 1937. Authors' reprints presented to the Library are included in the list of articles.

For abbreviations of titles of periodicals see *Geography*, vol. xlv, April 1959, p. 142. Abbreviations not included there are: AG—Acta Geographica. CGQ—Cahiers de Géographie de Québec. F—Fennia. FKO—Földrajzi Közlemények (Hungary). GA—Geografiska Annaler. GB—Geographical Bulletin, Ottawa. GRI—Geographical Review of India. GV—Geografski Vestnik. LG—La Géographie (Belgium). MO—Marine Observer. MW—Mitteilungen der Geographischen Gesellschaft Wien. NG—New Zealand Geographer. NGT—Norsk Geografisk Tidsskrift. OG—Oriental Geographer. PFG—Professional Geographer. RCG—Revue Canadienne de Géographie. SAJ—South African Geographical Journal.

(E)—English summary. (G)—German summary. \*—Maps.

**GENERAL GEOGRAPHY.** BHG, June '57 and June '58.—Thèses déposés à la Sorbonne, 1953-1957. S. CAVALIERE, GNS, Vol. 4, '59.—Geography, unity or synthesis (in Italian). E. A. ENGELBERT, PFG, Vol. 6, '54.—Contributions of political science to the theory and methodology of regionalism. T. J. D. FAIR, SAJ, Dec. '56.—Geography and physical planning. B. P. D. and J. GJESSING, NGT, Vol. 15, '55-'56.—Geographical theses and publications of Oslo University, 1952-56 (in Norwegian). R. HARTSHORNE, A of G, June '58.—Concept of geography as a science of space, from Kant and Humboldt to Hettner. D. J. M. HOOSON, A of G, Mar. '59.—Recent developments in the theory and content of Soviet geography. G. M. HOWE, GJ, Mar. '58.—Geography in the Soviet universities. P. LECONTE, I.G.U. NEWSLETTER, Vol. 10, '59.—Histoire de l'Union Géographique Internationale et des Congrès Internationaux de Géographie. J. R. MACKAY, A of G, June '58.—Chi square as a tool for regional studies. Z. MIECZKOWSKI, PG, Vol. 24, '57.—Two centuries of geography in Moscow University (E). A. C. MONTEFIORE and W. M. WILLIAMS, GS, Vol. 2, '55.—Determinism and possibilism. R. S. PLATT, A of G, June '57.—Regional geography. Review article. J. SCHMITHUSEN, BD, Mar. '56.—Natural region and landscape from the point of view of plant-sociologist and geographer (in German). G. H. SMITH, A of G, Mar. '59.—Armin Kohl Lobeck, geomorphologist and landscape artist, 1886-1958. O. H. K. SPATE, GS, Vol. 4, '57.—How determined is possibilism? L. D. STAMP, IBG, '57.—Geographical agenda: a review of some tasks awaiting geographical attention. H. THORPE, GS, Vol. 2, '55.—Geography in the Danish universities. R. WAGNER, FKO, Vol. 80, '56.—Notion of a geographical region (G). E. L. YONGE, GR, Oct. '57.—National atlases: a summary. L. ZÖBLER, A of G, June '58.—Decision making in regional construction. L. ZÖBLER, A of G, Dec. '58.—Distinction between relative and absolute frequencies in using chi square for regional analysis.

**CARTOGRAPHY AND MATHEMATICAL GEOGRAPHY.** M. E. DUMONT and A. ANTEUNIS, LG, Vol. 4, '52.—Een practisch procedé voor het Vervvaardigen van cartogrammen met sferen. S. D. GUPTA, GRI, Sept. '57.—Methods of isopleth mapping. R. A. H. MILTON, C. A. BIDDLE and B. W. SPARKS, GJ, Dec. '57.—Surveying aneroids: their uses and limitations. J. T. MAGGILL, GR, July '58.—Map of coastal landforms of the world. R. E. H. MELLOR, GS, Vol. 3, '56.—New Soviet world atlas: a review. E. MEYNEN, BD, Dec. '56.—Classification of maps by scale. The geographical need for a map on the scale 1 : 200,000 (in German). A. A. MILLER, GS, Vol. 2, '55.—Notes on the use of the height-range diagram. A. H. ROBINSON and R. A. BRYSON, A of G, Dec. '57.—Method for describing quantitatively the correspondence of geographical distributions. A. H. ROBINSON and N. J. W. THROWER, GR, Oct. '57.—New method of terrain representation. J. R. STACY, A of G, Sept. '58.—Terrain diagrams in isometric projection. R. TUXEN, BD, Oct. '57.—Present day potential natural vegetation as object of vegetation mapping (in German). (Extensive list of vegetation maps of Europe.) P. L. WAGNER, A of G, Dec. '57.—Contribution to structural vegetation mapping. W. C. WATSON, SAJ, Dec. '58.—Outline plotting maps: the need for them and their use. R. L. WILLIAMS, PFG, Mar. '54.—The hatchet planimeter. R. L. WILLIAMS, A of G, June '58.—Map symbols: equal-appearing intervals for printed screens.

**PHYSICAL GEOGRAPHY.** R. J. CHORLEY, GJ, Sept. '58.—Aspects of the morphometry of a "poly-cyclic" drainage basin. E. DERBYSHIRE, GA, Vol. 40, '58.—Identification and classification of glacial drainage channels from aerial photographs. G. H. DURY, IBG, '58.—Tests of a general theory of misfit streams. L. EGYED, FKO, Vol. 83, '59.—Shrinking expansion or magmatic currents? A. GUILCHER, SGM, Dec. '58.—Coastal corrosion forms in limestones around the Bay of Biscay. G. JOHNSON, GA, Vol. 40, '58.—Peri-glacial wind and frost erosion at Klagerup, S.W. Scania. H. KUHLMAN, MEDDELSER FRA SKALLING-LABORATORIET, Vol. 16, '59.—Quantitative measurements of aeolian sand transport. G. NANGERONI, RGI, Dec. '58.—Criteria for the classification of natural subterranean cavities (in Italian). J. R. RICE and others, SGM, Apr. '59.—Periglacial phenomena. D. RUOCCO, GNS, Vol. 4, '59.—Modern tendencies of coastal morphology (in Italian). R. SCHERHAG, GRU, Oct. '58.—Problems and tasks of aerology in the I.G.Y. H. C. SHELLARD, MO, Oct. '58.—Measurements of temperature and humidity profiles near the sea surface. H. SVENSSON, SGA, Vol. 32, '56.—Curve fitting to river profiles (E). U. TUINSTRÄ, GT, Feb. '59.—Eustatic movements of sea level. H. J. WIENS, A of G, Mar. '59.—Atoll development and morphology. S. W. WOOLDRIDGE, IBG, '58.—Trend of geomorphology.

**EUROPE. Physical.** K. W. BUTZER, RCG, Pts. 3-4, '58.—Russian climate and the hydrological budget of the Caspian Sea. A. COLEMAN, IBG, '58.—Terraces and antecedence of a part of the river Salzach. J. FINK, MW, Vol. 100, '58.—Soils of Austria (in German)\*. D. FURLAN, GV, Vols. 29-30, '57-'58.—Precipitation in Yugoslavia en tant que reflet des "moussons" d'Europe (in Yugoslavian) (F). J. KAKAS, FKO, Pt. 4, '58.—Climatic problems of Lake Balaton, Hungary (E). F. MANCINI, RGI, Dec. '58.—Quaternary terraces of the Lima valley, Tuscan Apennines (in Italian) (E). H. MARUSZCZAK, CG, Pt. 3, '58.—Relief forms of the loess area; Lublin upland (E). A. PECORA, GNS, May-June '58.—Falling level of the Caspian (in Italian). J. PELLETIER, RGL, Pt. 2, '59.—Relief de l'Appennin septentrional. N. A. de RIDDER, UTRECHT UNIV. GEOG. INST., Pub. No. 13 B, '57.—Morphology of the terrace region in the Mosel district (in Dutch). B. ROSA, CG, Pt. 3, '58.—Postglacial Baltic transgression on the Polish sea coast (E).

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